FAR NORTHERN REVIEW

November 1988

CONTENTS

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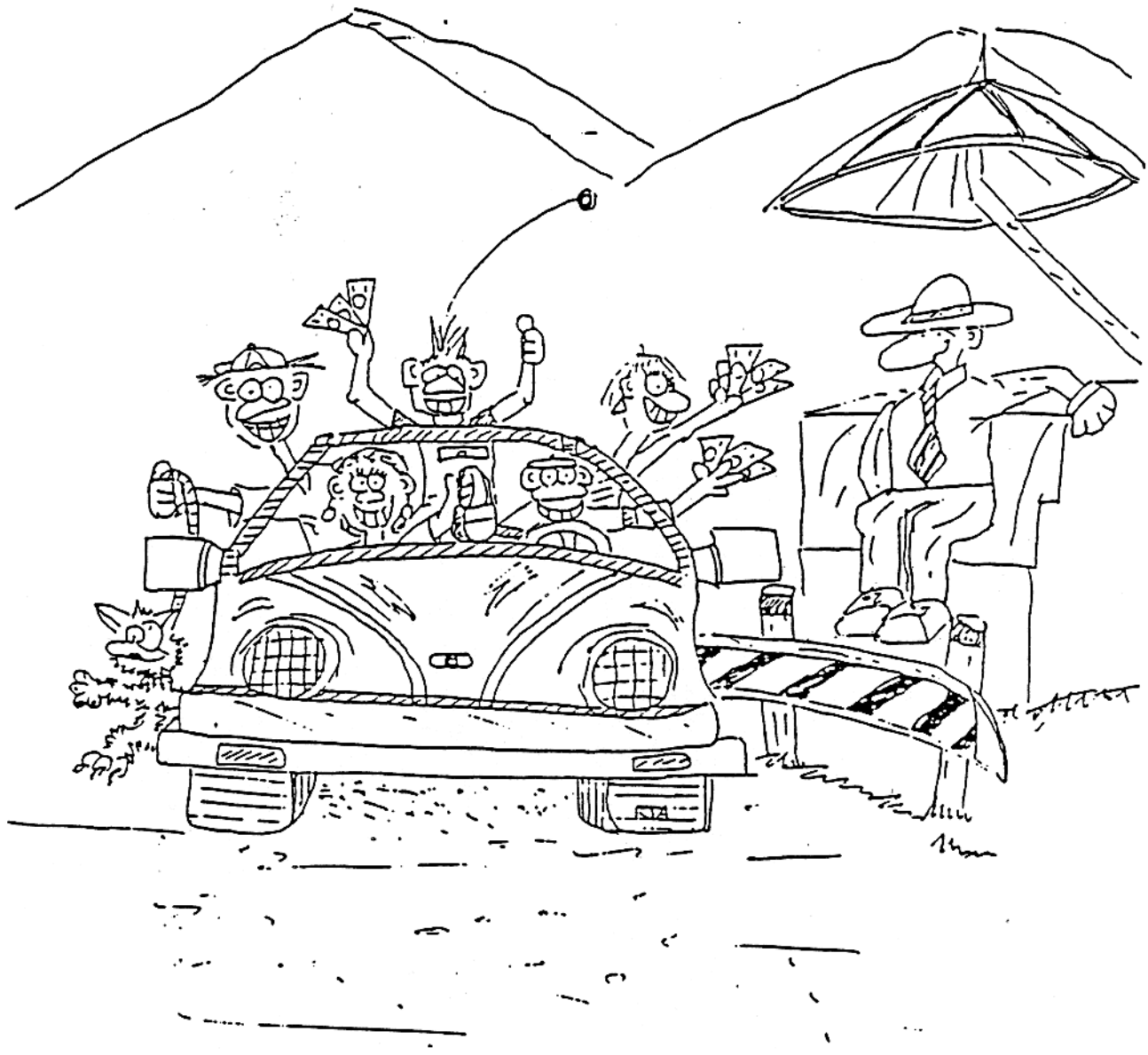
Contributions:

Any notice placed in the Classified section must be accompanied by an article (no matter how small) as payment for the service. In general, contributions are compulsory. Every employee within the region must submit at least one item each year. The Editor will keep tabs.

DEADLINE FOR CONTRIBUTIONS IS THE FIRST DAY OF EACH ISSUE MONTH

How public support for user pays can be encouraged



EDITORIAL

Instantly recognisable is this special frog edition, sharing the theme with Incidental Fauna and Flora Surveys. Many of you will no doubt go 'yuck' and instantly turn off. But frogs are such beautiful creatures and are often overlooked in favour of the larger mammals and birds.

The prime function of this publication is to transfer information (that is essential to park management) to the person on the park who can then apply that knowledge in running the park, or more broadly, carrying out the Service's aims.

To this end, each issue will feature a theme that highlights major or significant aspects of our work.

The public's general perception of Rangers' work, is dealing with wildlife, and indeed many of our interpretive brochures have illustrations of Rangers with wildlife all over them. Yet how many of us even see any wildlife, let along handle any? And cerainly not many park staff know much at all about what fauna or flora they are caring for in 'their', parks.

So, in a vain attempt to highlight the fact that yes national parks do contain animals and plants, and yes, we as managers of these lands must know what is where; and no, no research is being carried out; and yes it is up to each and every person who works on a park.

The incidental fauna and flora survey was set up for this very reason and it is an officially sanctioned Service project and everyone should be involved with it.

What are we in this business for anyway?

Results of Reader Survey

Of the 100 copies of the Far Northern Review that were printed and distributed, only 4 completed survey sheets were returned. From the point of statistical analysis 4% return is pretty good.

From the point of view of staff communication, working together, camaraderie etc, it was a little disappointing.

Results

1. 3 returns from FNR
   1 return form NR

2. 3 happy with title
   1 no comment

3. 4 interesting
   1 educational
   2 thought provoking

4. To be left out:
   'excessive political diatribe'.
   To be included:
   'more wildlife news'.
   'more from the library eg. book reveiws, how to use the library'.
   'The latest on changes to Q.NPWS from Scott Johnstone'.

5. Future Subject Matter
   'Fire, Feral Fauna, Conservation Education, Book Reviews and Major papers on conservation, Maritime Environment (includes islands)'.

   'Role of staff ie. Overseer, Ranger, MO bit more on maritime'.

   'The Services failure to comply with its own policy of advertising jobs in order to get the best possible personnel! Filling jobs for the boys. The lack of knowledge of some senior staff about their own employees. Stan Wilcox is a classic case in point.'.

   'I note the ommission that sections do not include RNC, Research and Interpretation. I appreciate that the editor is a developer but does he have to ignore these topics'.

The above is the sum total of the survey returns. Very little to base future direction of this publication.

However, it is hoped to eventually cover all these areas and more. This can only be achieved by input from people working in these areas. More maritime news means someone (or more) in that area has to provide information and articles for inclusion, similarly the research, interpretation, personnel management, administration etc.

Each issue will have a major theme:
January - Vegetation (habitats) and fire.
March - Fire and its management.
May - Interpretation.

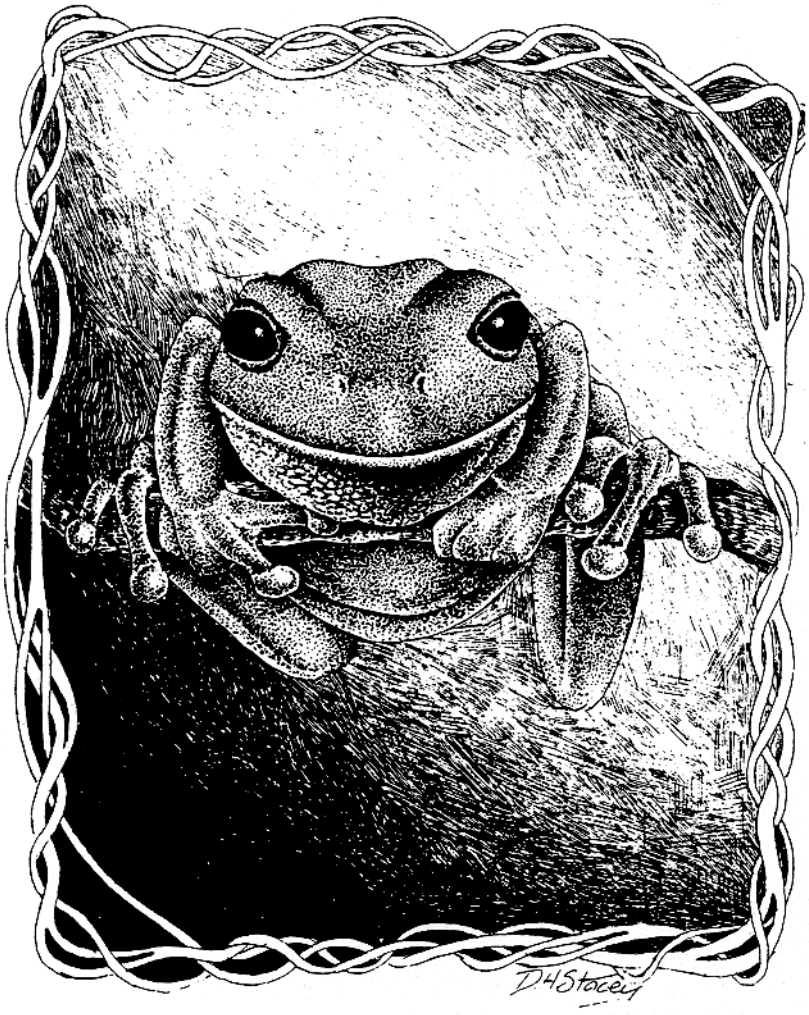
Other suggested themes include:
Park Management planning - philosphy, EIA's, site selection, types of planning.
Feral Fauna - cats, goats, pigs, toads, rats. Staff training.
Maritime management.

Please do not wait to send in articles on these subjects. Forward them immediately. Material will be printed as a lead up to the main theme of the next edition.

Do raise any matter that you wish to be highlighted.

Write something now!

Mike



PEOPLE & PLACES

Cape Yorkers

Its been busy in Cape York for the last month of three with several staff moves, recreational leave, relieving duties and squeezing all those jobs in that need to be done before the wet.

I will be sorry to loose Ron and Marion Lynch from New Laura. Ron applied for and got the Palmerston job. Ron and Marion are top operators and I'm sure that the Palmerston National Park will greatly benefit by their presences.

The New Laura job is currently advertised and we will be filling it in late November. Danny and Donna Chew have been transferred from Heathlands to Chillagoe and Danny tells me he will be really practising for a baby once he gets out there. I'll miss the Chew presence on the tip but wish both Danny and Donna the very best for their new posting.

Graham Burst has resigned from Iron Range and is going to pursue a full time career of selling grog to the aboriginals.

Trevor McLeod has been transferred (can be declined) to Heathlands from his Chillagoe post. I trust Trevor will take the transfer as Heathlands/Jardine is a challenging park to manage and several projects are planned.

They tell me that Ron Teece and Mike Delaney are gong into the National Park oil drilling business after the announcement by Martin the 'Mouth' Tenni that oil had been discovered on Lakefield National Park.

Cheers
Gary Rees

A Ranger's Experience - Royal National Park

Drivers had little difficulty in finding parking spaces for their vehicles in Martin Place. Traffic was so light in the centre of Sydney that the sounds of human voices predominated. In contrast the GPO clock was silent it had been removed for safe keeping. The year was 1942.

I stood on the footpath in front of Challis House, 10 Martin Place, where the National Park Trust secretary, Miss Ballhausen, and a pair of sparking eyes, shining through

elegant rimless glasses had hinted that I might soon be employed by the National Park Trust. I was happy, and my ears were very receptive to the lilting Irish-sounding voices of the many American servicemen around the sun-drenched Cenataph. There had not been much rain for years and on some days the sun was hidden by dust which had left the outback and was on its flight overseas. But on this day the sun shone on the trees in Martin Place.

A twice-stamped 'Medically Unfit' army exemption, my residence in a little stone cottage in Loftus and a shortage of manpower were probably significant factors which outweighed my complete lack of experience, so I went to work in the National Park. Some sort of justification had to be offered to the wartime government to allow the Trustees to retain the services of a few men. It had earlier been decided that the production of charcoal for fuel for motor vehicles was an essential service. There were not too many charcoal-burning vehicle around but promise to supply charcoal allowed the Trustees to keep a crew of men. Many of the last great trees were thus transformed into charcoal in great pits dug in the floor of the rain forest in the park. The rending of the trees in the forest was probably a suitable inclusion in an orchestration for war but unfortunately could not be included in the recapitulation of the score.

The reward for creating the charcoal was not enough to pay the wages of the producers and the scheme was reduced to a token effort.

The government grant in those days never seemed to be adequate and it was supplemented by royalties from the removal of clay and gravel from the park. An addition source of revenue came ;from shire bakeries in return for cords of baker's wood. I started cutting trees with a blunt old axe and the ones I gnawed down left stumps which would have shamed a beaver. Eventually the Trustees received a permit from the War Department which allowed Anthony Horderns to supply me with a new axe.

The axe a 476 Black Kelly, soon became a fetish. I fined down the white hickory handle with broken glass, made a leathern mask for the blade and bought a round axe-stone upon which I spat as often as was necessary to keep the blade razor sharp. I did not like cutting old wattles for the baker's ovens, they left a residue of dried resin on the blade and this took a lot of removing. Numerous turpentines were cut for the park mill and these were easier proposition. I still hear the tight creaking sound of the blade when the trees released it after the first blow had bitten into the live wood. The odour of the sap was only slightly less pleasing than the odour of boiling billy just after a handful of tea has calmed the turbulence.

But there was a greater turbulence in the work and the park on its fringe became a military area. The main army camp was located in the Loftus area of the park and was cut off from intrusion by the posting of armed sentries.

On some days the whole park was closed to the public as army manoeuvres were preformed. At other times there were bivouacs throughout the park. Route marches on the roads and jungle training in the rain forest must have given men a strong scent of impending reality.

Near the top of Artilery Hill today, and within a metre of thousands of speeding vehicles, is a depression on the rock face. It was always full of clear water and only the bees use it, but many soldier broke ranks to scoop up handfuls of the liquid 'yesterday'. It is one of my links with the past and the memories associated with it are private.

A military post was set up at the end of the of the Audley boatshed to the house the sentries who guarded the hundreds of boats which had been confiscated by the Army and left in and out of the Port Hacking River at Audley. Many a rueful owner bewailed at the fate of his craft. The beaches in the park were strewn with tanktraps. Audley Hill and the road just below the waterfall were mined.

The only factual evidence that I saw of the real war came drifting on to Garie Beach early one morning. It was a ship's lifeboat. No one was in it, neither did it have any gear aboard. No mark of identification could be seen which would have provided a clue to its origin. The military authorities released the brooding hulk as salvage and it was tendered for, and bought by the boat builder at Audley boatshed. He installed and engine into it and turned it into a very seaworthy fishing boat.

The war passed and the Army ceased to occupy the park on a fulltime basis but for years afterwards the field exercises were carried out. Two areas suffered and have never recovered, one the army camp area at Loftus and the other, the Wattamolla Headland. An area which did recover lay between Wise's Track and the Bundeena Road. This had been subject to live shellfire. Even today live shells are still being discovered and are usually detonated where they lie by the Army.

Until my arrival the park had not been patrolled by rangers from some time and I only sporadic patrols by the Superintendent were carried out during the wildlflower season. He took me with him and gave me some training and advice. This, coupled with the fact that I owned a house and could ride, soon developed into a permanent ranger's job.

I soon proved that fulltime patrols were necessary and this removed from my mind another problem of those times of limited funds. Every man feared that he might be put off during periods of lighter visitation. I was more fortunate than some for I never lost a week's work.

The park was in a sorry state. The armed occupation by the Army had left its scars and an unruly public was providing additional problems. A number of practices had developed during the depression and had been overlooked. I found scores of illegal occupancies over a wide area.

Where, during the depression, people without homes were allowed to build humpies on the old Rifle Range near Sutherland, there now existed occupations as far as the Engadine overhead bridge and on both sides of the roadway. I found out that men were living off the park by stealing its resources. Some were supplying florist shops with greenstuff to be added to bunches of cut flowers. Whole Christmas bush tress were hacked down for quick removal to be cut up into bunch size in an area more secure from detection. I discovered two dams where wild parsley or crinkle bush were dyed and sold. Areas of waratahs were bent over and tied down before the blooms burst so that they wound not be noticed and were thus reserved for professional pickers. One family alone had three pickers including the father and two sons. I reported them on several occasions and they were fined but was a lucrative game and they took a chance. One night I saw the elder son driving a truck load of Christmas bush branches to his home. I was a few kilometres outside the park but I arrested him and charged him with 'goods in custody'. He was fined the maximum penalty, put on a bond and told by the magistrate that the next offence against the National Park would mean prison. The family found a new source of supply.

Other men were allowed to remove fallen timber from the park. This was still allowed until, after a period of observation, I proved that they were cutting green timer and allowing it to dry. They had then classed this as fallen timber and removed it from the park. Still others were removing black soil from the south end of the park and also supplying local tennis court owners with yellow laom from the north end.

After the war ended petrol flowed freely and a gradual increase in vehicle entry was seen. Until this time most people came by train, and picnics like the Ironworkers from Wollongong attracted figures in excess of 20,000 people. Hot water was supplied to the Audley kiosk by an old donkey boiler and I was often called to the kiosk to control the queues of people waiting for boiling water. I remember other large annual gatherings like those of the Standard Telegraphic Cables and Flour Millers picnic's. Where once the Millers's picnic drew several thousand people, the last one I saw was attended by several hundred people who didn't speak english. There has been a decrease in recent years in children's Christmas parties in the park with a corresponding decrease in broken bottles, broken heads and drownings. There has also been a dramatic decrease in the picking of wildflowers by visitors. Once upon a time it was a tradition to pick a bunch of Christmas bells and a bit of Christmas bush at Christmas. This has passed and something has been lost. It is strange that the cessation of an illegal act should diminish us.

Boys no longer spend hours looking for a Y-shaped fork of a Christmas bush tree to cut, skin and bake into and efficient catapult handle. They no longer climb trees to steal bird eggs. Even the forces of passion seem to be spent on lovers tracks, now closed to the public, are used by countless boys on trail bikes. The changing pattern of the park, from a country park to a city park, could well be traced by studying the behaviour of boys over the last 30 years. The barefooted, sometimes ragged boy who frequented the swimming holes in the park has been well and truly replaced by a boy not nearly so close to nature.

I dabble in the German, Swiss and Yiddish languages, old English and old Scottish, but none of these have benefited me so much as my schooling in the universal language of happiness, Grief and Sadness.

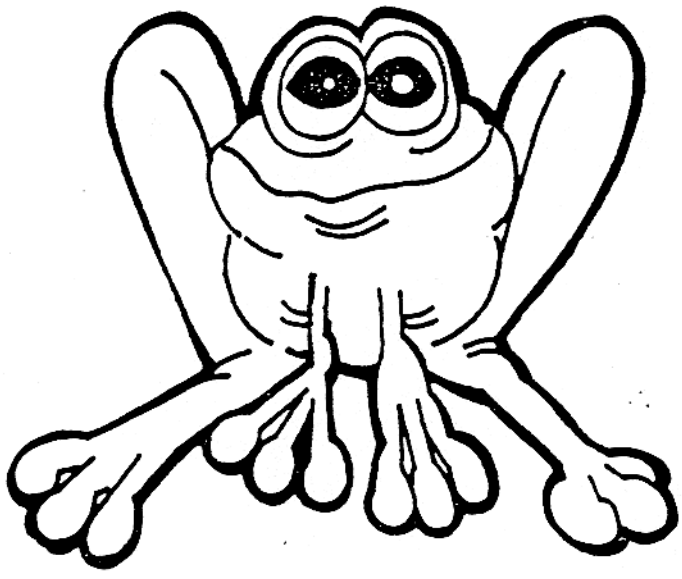
Many a time I have seen laughter change to tears. I have attended the scenes of two triple drownings and on two early mornings the scenes of two triple fatalities on the roadway. In my earlier days I was usually first on the scene of tragedy and I have seen numerous lives squandered; squandered on the roadways, in the

creeks, in the surf, on the ocean's rocks and in gas filled vehicles. Many people, I couldn't make and estimate, have chosen to leave this material world in the quiet corners of the park. Some have had their ashes returned to the soil. I have never felt alone on my countless night patrols.
Today I look into the faces of people of different creeds and colours. Some seem to fit into the scene, usually the younger ones, other seem bewildered, usually the older ones. I often observe older people when the sun has warmed them and I wonder what their thoughts are and I wonder if their spirits will remain here.

On many a still clear morning I sometimes used to pause on a high point in the park and look upon Sydney. It presented a pleasing sight, separated from me by a circle of green and dominated by the graceful arch of the Harbour Bridge, and the wind sings a pleasing song.

Now the green has gone, the Harbour Bridge has been humbled....and the wind signs a different song.

Harold Senior
Ranger
Royal National Park



Bureaucrats

Every bureaucrat has a very clearly defined logic bubble. He or she is selected because of a match with the existing culture of the organization. Bureaucrats want to operate the system according to the rules and procedures because this is the universe of action - and in time they may move from being the guardians of the rules to the designers of new rules. There is an unwillingness to be visible. As all costs visible mistakes are to be avoided. The simplest way to do this is to stick to the rules and , where possible, to pass the buck to someone else. Many problems will go away or lose their intensity if time is used as a positive weapon.

The rewards for initiative and enterprise are so vastly outbalanced by the penalties of failure and mistake that no intelligent bureaucrat will so contradict his or her logic bubble as to be entrepreneurial. Even a successful enterprise creates enemies and risks promotion on the basis that promotion comes to 'sound people' who do not take risks with innovations.

None of this - in anyway - is a fault or deficiency on the part of bureaucrats. In my experience they are highly talented people. They are anthill gent enough to play the rules of the game as they are written by the nature of bureaucrats. Survival is what it is all about - as it is in politics.

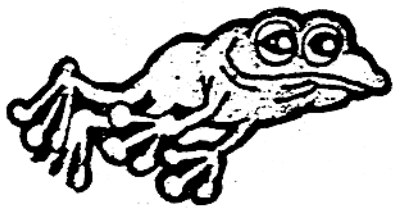
So when we look at institutions or organizations that might play a role in the resolution of conflicts, we have to consider to what extent such organizations are energized by bureaucrats. If this is the case there will almost certainly be a lack of that design enterprise that is required for conflict resolution. In setting up any new organization, such as SITO this is a danger that will have to be avoided.

The thinking style required for administration is quite simply not the thinking style required for enterprise and design. This is seen very typically in the administration can completely kill the social enterprise role which must be the sole justification for such foundations to pioneer things that would otherwise never by pioneered.

INTER REGIONAL NEWS

Far Northern Region

Overseer Dave Bender from Palmerston was releived of duty. Overseer Ron Lynch from New Laura, Lakefield has been transferred to Palmerston. Temporary worker Mark Gayle has been placed at Palmerston until Ron Lynch arrives. Overseer Danny Chew has been transferred from Heathlands/Jardine to Chillagoe, while Trevor McLeod is moving from Chillagoe to take up the Heathlands position. Overseer Graham Burst from Iron Range has resigned. Acting Reional Administration Officer, Lewis Hayes has been promoted to RAO Norther Region while Paul Curtis, RAO Northern has been transferred to Cairns. Marine Park Ranger, Nigel Hedgecock has taken leave and is off around the world in 10 weeks. Carolyn Pratt, typist and telephonist, has been put on full time.



Northern Region
Overseer Dean Brake, from Mr Isa has resigned and gone to Northern Territory parks.

Overseer Bruce Knuckey has transferred to Gladstone as District Overseer.

Senior Overseer, boat skipper, Don Duffy, from Cardwell has resigned.

Ganger Rob Graham from Magnetic Island has resigned and been replaced by John Parton.

Management Officer, Bob Spiers has transferred to Brisbane to fill the Marketing Managers position made vacant by Bob McTaggart.

Central Region staff movements

There's a bit of a baby boom in the Central Region. Vicki and Gordon LaPraik (Gladstone Maritime) had a girl, Amanda Kay, born 18 October 1988.

Peter Slaughter (Rockhampton Maritime) and wife Barb scored a girl too, Kate, born 19 October 1988.

Paul Lawless-Pyne's wife Jessica is due any day. (Paul hails from Springsure District).

They were additions, now for some losses:

Konrad Beinssen (head of Maritime Estate) left us on Friday 21 October - to take up abalone fishing down south.

Ivan Smith (Rosslyn Bay) who has been with Q.NPWS and previously Forestry since 8 o'clock day one also left. Both staff are both sadly missed, already.

John Messersmith and wife Amanda have just returned home from a 6 month US holiday. It's funny really, John has come back with an American accent!

Southern Region
Workman Justin O'Connell transferred from Frazer Island to Eastern Scenic River.

Fiona Stevens appointed as a workman on Frazer Island.

Stan Powell transferred from South Cooloola to North Cooloola.

Damien Milely appointed to North Cooloola.

Bob Shuttz has replaced Bill French as Senior District Overseer.

FAUNA CORNER

Queensland Police Fauna Protection Squad

The past few months have been very active for the squad to say the least. Most jobs attended to by the squad have been interesting and significant with regard to the fauna types and the people involved.

Our major busts, summarised were:

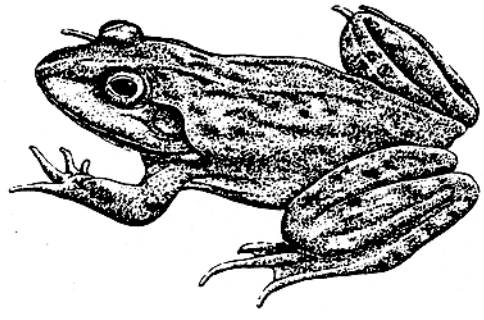
- The seizure of 73 Lorikeets and Major Mitchell cockatoos from a suburban home at CAMP HILL in June. A 'Well known' identity in the black market bird trade was prosecuted for taking and keeping protected birds and fined a total of $2,500.

- The raid of the home of a well known Vet resulting in a totally unexpected reaction from the 'lady' of the house in an attempt to effect our purpose. Found was the remains of a 'Mexican orange kneed tarantula' popular on the world black market and a member of the CITES list of endangered animals. (Incidently, the lady was charged with obstruction under the FC ACT).

- A tour of duty in Cape York Peninsula in July with fellow fauna officers from CAIRNS. We investigated some croc offenses and gathered a great deal of info and intelligence concerning clandestine activities up there.

  (I hope the crocs weren't too offensive? -Ed).

- The raid of a property near KILLARNEY netting 70 rosellas and Lorikeets - all trapped locally. Another villain was charged and copped a few hundred $$$$ in Warwick Court.



- In August, a certain WARWICK person known nationally for his never ceasing bird trapping efforts was arrested near ST GEORGE with 74 Major Mitchell Cockatoos. He was apprehended at 1.00am after an on and off surveillance operation which took a few weeks. The channel 7 boys were one step behind us all the way and they put together a top news story which went to air nationally on 3 August 1988 and again on 12 October 1988 when the villain was convicted and fined a total of $24,800.

- Late in September, a grub was busted at his breakfast table by 'Dash' MOLONEY after info was received from one of our sources in SA that a Qld registered 4WD was seen near INNAMINCKA with a load of birds and reptiles. Seized were 12 cockies and galahs (nestlings) a baby eagle, and 2 shingle back lizards. I think we are fast becoming the 'grim reapers' of the Fauna Smugglers world.

- 5th October, and another surveillance operation in bushland at STRATHPINE. An offender was trapped by us checking his possum trap. A few minutes later we paid a visit to his home and did a bit of house work for them. 4 possums all up, 19 Lorikeets, and 3 snakes seized.

  The snakes were located in the bottom of an empty wheely bin in the yard.

  The snakes were wheely sick, having bin in there for some time. The offender gave an explanation but, you guessed it, it was all rubbish!

  Pleased to say that after a cold bath by Michelle and me, they are a lot better. Possums and birds likewise. A juvenile and his mother are to appear in the Mag/court PETRIE in the near future. (People that is - not possums).

- That's about it for now, but in this job, you never know what's around the corner.

Gavin Ricketts
Det Sen/Const.

Foster dads find koalas are just too human

MEET three men and their babies. This is the family album shot just a little different to any picture of a proud dad with his daughter.

Snoozer, Fudge and Face Ache are orphaned female koalas taken in and hand-raised by their foster dads, National Parks and Wildlife Service rangers Bob Hoey, *left*, Ric Nattrass and Peter Theileman.

Ric, the wildlife service's chief ranger, said koalas were the only native animals which lived to a ripe old age like human beings.

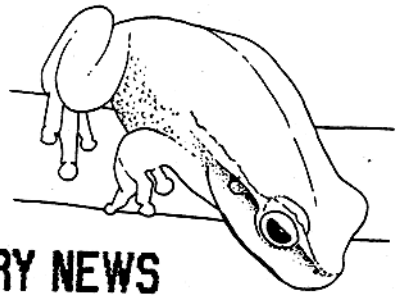
He said being a dad to a koala was "much worse than having a human baby to look after".

"And most of the time, they don't even say thanks. See, they are like human kids."

The koalas' stories are tragic ones. Face Ache's mum was killed by a dog in bushland near Mount Cotton, and baby, now eight months, was found suffering bite wounds.

Both Snoozer, 2, and Fudge, nearly 12 months, were found in Brisbane bushland clinging to the backs of their dead mothers.

When Fudge, Face Ache and Snoozer are old enough, they will be weathered. This means spending time in a bush-like enclosure to get the koalas used to rain and wind and, of course, being without their foster dads.



NIGEL'S NURSERY NEWS

Following the incredible response to my article in the last FNR, (Richie Carrigan sent 1 pack of bleeder seed - thanks Richie!!) I have reluctantly decided to do it again. Listed below are the ones to look out for over the next couple of months.

Atherton nuts (Athertonia diversifolia) ripe.

Brown tamarind (Castanospora alphandii) fruit ripening.

Flame trees (Brachyehiton acerifolius) in bright flower.

White flower spikes in massed bunches on bulloaks (Cardwllia sublimis).

Long delicate recemes hang from Barringtonia trees.

Parrots going mental in flowering black bean trees (Castanospermum australe).

Findlays silky oak (Grenvilla baileyana) producing spectacular white flower spikes.

Red wheel shaped flowers appearing on firewheel oaks (Stenocarpus sinuatis).

Creek cherries (Syzigium australe) in mass flower (white sprays) all along streams.

Red arils on ripening nutmeg fruit (Myristica insipida) attract many fruit eating birds.

Pink flowers on the Euodia trees (Euodia elleryana) attract countless birds and butterflies including the blue Ulysses.

Cockatoos moving into sarsporilla trees (alphitonia spp) to feed on ripening seeds.

Cream bell shaped flowers attracting honeyeaters to silver quandong trees (Elacocarpus angustifolius).

Brown tamarind (Castanospora alphandii) fruit ripening and attracting cassowaries.

Candlenut fruit (Aleurites moluccana) dropping - watch your head!!!

Flower spikes up to 1m long hang from Meullers silky oak (Austrameullera trinerria).

N. Tucker
Lake Eacham Nursery

MANAGEMENT NEWS

Apology
The last issue of Far Northern Review printed that the Service has endorsed the Associate Diploma Course from the Northern Rivers College of Advanced Education. This is **NOT** so, and I must apologise for any inconvenience this has caused. -Ed.

Queensland Agricultural College (QAC) has now amalgamated with Queensland University. For those interested in furthering their qualifications:

The present 2 year Associate Dimploma Course will still operate.

This Course will be offered as a correspondence course in 1990.

A new 4 year full time Degree Course - 'Natural Systems and Wildlife Management' will commence in 1989.

For further information on these courses contact QAC, LAWES, QLD 4343

PAPER
The Toowoomba Office has started to recycle paper. It is as simple as phoning your local paper recycler and having a bale delivered. While the $$$$ raised are unlikely to make us millionaries, the satisfaction of knowing that we can recycle some of our resources is worthwhile.

Head Office has approved a 50% discount on the booking price of school groups camping on National Parks.

Regional Director Noel dawson states that visitors to parks tend to be earning more than $25,000 per annum.

One could argue then, that Q.NPWS staff are under-priviledged and should also be granted a discount - like about 100%

Cape Tribulation

Development is encroaching rapidly on Cape Tribulation. About three months ago, the first Coca Cola sign appeared. Then came the first concrete causeway. A second causeway has now been completed at Mason's Shop, and work has commenced on Coopers Creek - the largest creek crossing. Bitumen has been laid on the southern approach to the Daintree ferry, and the whole length of road from Daintree River to Cape Tribulation has been formed and gravelled. A telecom tower is being erected on the Alexandra Range (within park) and telephone cables are being laid at present. Cape Tribulation should be connected up by Christmas.

The Cape Tribulation carpark/day use area was closed off to traffic for 2 weeks in October while Douglas Shire Council and Q.NPWS constructed a new design carpark.

The area currently attracts a regular 76 commercial tour operations, and the growing backpacker population is catered for by two lodges and a third is currently being built.

I still reflect on the days, only a handful of years back, when the road stopped at the cape, and one experienced the magic and grandeur of an environment unblemished by development. But I guess everyone will say that at least once in their lifetime.

Mossman Gorge

A pheumatic traffic counter was installed at Mossman Gorge in Late August. The whole of September saw an average 8,000 people per week visiting.

Regional Staff were in Cairns during Septemeber to learn how to take money from the public. Whilst everyone was together, a carry over day was arranged for regional staff to discuss the proposed new wages award. Twenty five wages employees prepared a summary of recommended alterations to the proposed award. this was faxed to Lester Harth the next day, but as expected no reply was received, not even an acknowledgement of receipt.

Wages Award Working Committee Respresentatives, Southern Region

A meeting was held at Moggill on 30 August for southern region wages staff. A working committee of three people was appointed by those staff present (Ken Whitlock, Dianne MacLean, and Ron Alford). The purpose of this committee is to represent the views and concerns of Southern Region wages staff, with regard to the proposed wages award. They were to negotiate wherever necessary with whoever it is considered necessary to attain this objective.

Our first and persistent approach was to forward our recommendations to EMG through Lester harth of Management Services.

It is considered by all parties that the proposed Q.NPWS wages staff award is a very important document as it sets the bases for wages and conditions for now and into the 21st century.

We, after much discussion have arrived at the conclusion that the only effective way to look after your interests is through the union.

There are three unions involved.
1. The POA
2. The AWU
3. The Merchant Service Guild

We as committee have had a number of worthwhile discussions with the AWU.

We are presenting your views through the AWU as this appears the only effective method.

The AWU is looking for expressions of support in practical terms.

Your committee considers it unrealistic to expect the AWU to support us unless we support them by taking out membership (see the tear-off portion of this memo at the end).

The time frame of events is as follows.
1. Meeting at Moggill by wages staff 30.08.88 expressed concern over the new wages award;

2. Meeting between Q.NPWS management and unions 15.09.88.

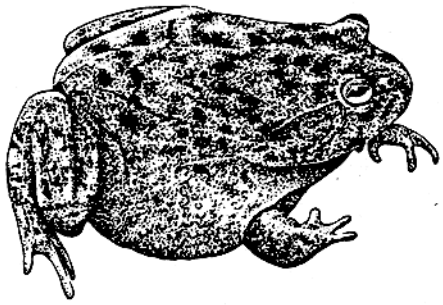
3. Second meeting by wges staff at Moggill 28.09.88 with representatives of the Australian Work's Union (AWU).

4. Meeting between Q.NPWS management, Qld Dept of Industrial Affairs and the unions on 19.09.88.
   - at this meeting AWU representatives conveyed concerns of National Parks field staff on the draft award;
   - AWU put forward 15 points they would like changed, these include:
     - basic pay rate in award unacceptable;
     - payment of higher duties for 4 hours minimum;
     - time in lieu conditions currently unacceptable;
     - loss of all purpose **and** disability allowance.

5. Meeting between wages staff representatives, Lester Harth and Denis Cavanagh from Dept of Industrial Affairs at Cheif Office on 03.10.88.
   - lodgement of new award with the Industrial Commission is likely to occur 21.10.88.
   - the award has not been changed (to date) in respect to the recommendations put forward by wges staff.
   - Qld Dept of Industrial Affairs has been working on this new award with Lester Harth for nearly two years. Denis Cavanagh from Dept of Industrial Affairs will be representing our employers, Q.NPWS at the Industrial Commission. The AWU, POA and Merchant Service Cuild will be representing us, the employees.
   - Dept of Industrial Affairs will request a quick hearing and determination of wages and conditions for the new award.
   - the Industrial Commission will then carry out field inspections together with the Dept of Industrial Affairs and the unions.

In February when the Industrial Commission reconvenes the various groups will be asked to report on their field inspections, the Commission may then make a decision on the award.

It is ESSENTIAL that those park staff appraoched remember and put forward to the Industrial Commission field inspections ALL ASPECTS FO YOUR JOB including managmeent and supervisory roles.



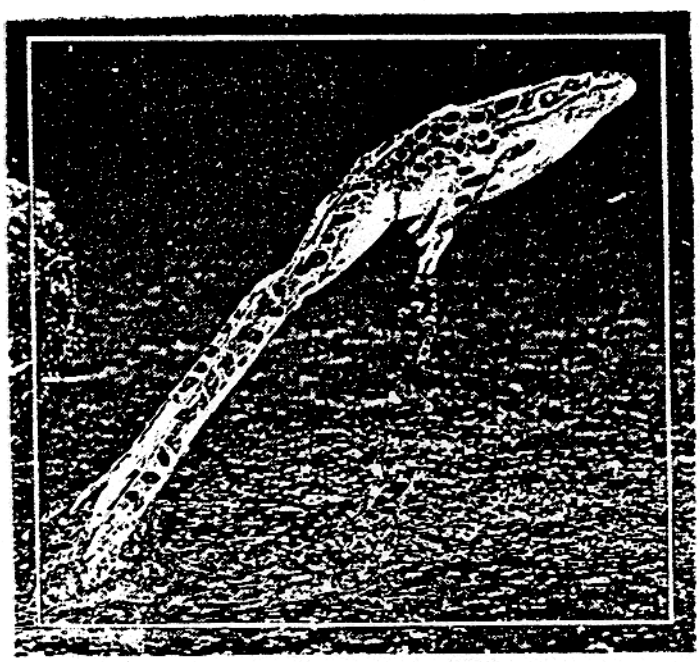
It would be to your advantage and the advantage of all wages staff to complete the checklist of your role and duties on the park and hold in case your park is chosen for inspection. It will also be a guide for you when/if a duty statement is drawn up for your position.

A decision about joining the union needs to be made by each person very soon.

- $122 per year (August to July) for AWU
- Tax deductible
- **No** deducation will be made from your pay by our accounts section. Qld Dept of Industrial Affairs advised Lester Harth it can't be done.

Bear in mind union memebership is not compulsory. It is your decision which, if any, union you join.

Please consider carefully the most effective action you can take to ensure your interests are properly looked after.



TECHNICAL NEWS

EQUIPMENT

BART'S BREAKDOWN

TECHNICAL NEWS - EQUIPMENT

As you all may or may not know, we are bound by Treasurer's Instructions to conduct all our purchases through the State Stores Board under State Stores Contracts. This, however, is not always practical and is quite often inconvenient.

Take for example water pumps. The contract supplier is Davey pumps powered by Honda motors. This has now been changed without warning. The supplier remains the same, the Davey pumps are the same, however, they are now powered by Briggs and Statton motors. One would think that when purchasing minor plant such as water pumps, uniformity is the key to easy maintenance and control of stock.

This is just one example and I'm sure that at some stage all requisitioning officers have had to put up with what they got whether they wanted it or not.

The answer lies on the following page: 'Complaint/Comment/Query on contracts or stock lines'. As it states on the example form, 'This Feedback is necessary to improve our Service, otherwise State Stores can only assume things are operating smoothly?!!

If you can relate to the possible subject matters illustrated on the form then go ahead and fill in a form and send it down to the SSB.

Forms are available from Dave McDowell or myself on request.

cheers, ROPE

COMPLAINT/COMMENT/QUERY
on CONTRACTS and/or STOCK LINES

Addressed to fit window envelope

To: The Manager
State Stores
G.P.O. Box 123
Brisbane. 4001

This feedback is necessary to improve our service, otherwise State Stores can only assume things are operating smoothly.

Action will be taken on all information received but you will only receive a reply where warranted.

— FOLD

State where applicable

Item/Description: .....

Contract Page & Item No.: .....Stock Item No.: .....

(NOTE: Not to be used for price variation queries)

Possible subject matters are:—

- ☐ Unsuitable articles.
- ☐ Suggested additional articles for inclusion in contracts and/or stock (include annual usage).
- ☐ Poor contractor performance e.g. poor or non-delivery, quality, etc.
- ☐ Other suppliers offering better prices or service.

Details: .....

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Date: ..... Name (please print): ..... Signature: .....

Dept./Institution: ..... Section/Branch: .....

City/Town: ..... Telephone: ..... Ext.: .....

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TECHNICAL NEWS

FACILITIES

Toilet troubles - the problems of toilet training the public

A few weeks ago, I was sitting reading the new 'Far Northern Review' when I discovered (shock horror) that my name was in print before me (were they finally on to me???).

Pushing aside my nightmarish visions of Tony Fitzgerald, I hurriedly scanned the article....thank god, I was only being coerced into writing an article for the review!

And so it is, under dire threats of exposure and blackmail, that I have to tell my story....

In September of 1987 three pit toilets were erected on Heathlands D & O Reserve. Two were situated at Eliot Falls camping ground, and the third at (what is commonly known as) Fruitbat Falls.

These toilets weren't just any old pit toilets, they were the all new, super-ventilated, cyclone-proof, termite-proof and bomb resistant 'Whitsunday' type toilets.

Seriously though, they are not a bad design at all. The ventilation is excellent due to the 150mm gap between the walls and floor, and the high domed open ended roof. The toilets are built out of 150mm kopper logs for the corner posts and 100 x 38 hardwood frames for the walls.

Galvanised iron is screwed onto the outside. The corner posts must have flat faces cut onto them to match up with the walls. The whole lot is bolted together with galv' bolts and is all mounted on two long bearers, which are bolted down onto concrete pads at each end. This enables one to pick up the whole assembly and move it to a new location if required. Leaving the pit liner and contents, of course!

The worst problem with constructing these toilets is cutting the flat faces onto the round, and not necessarily straight kopper logs.

The pit is lined with an open bottomed black poly cylinder, approximately 1.5m in diameter and 1.5m high.

Well, that's the high tech' description. But do they work? The answer is yes, as long as people use them properly, and they are installed in the correct place.

The toilet at Fruitbat was installed as per the plan, but without due consideration to the water table. True, the bottom of the pit was a bit wet when we dug it, but still the penny did not drop. Yes, you guessed it, in the wet season the water table rose dramatically with, shall we say, less than delightful results.

But what of the other two pits situated on high ground at Eliot Falls?

They would have worked excellently except for a type of organism called 'homo sapiens domesticus'....that's right, urban man.

It would appear that the Eliot Falls camp ground is situated at the precise point in their annual migration route up the peninsula where the rubbish bag becomes smelly and the primeval instinct to part with it becomes strong. Thus it was that many little rubbish bags found themselves abandoned in the bottom of a toilet pit at Eliot Falls, even though a rubbish dump was available at a mere 400 metres distance. I have been accused of delving into other people business at times, but this occasion I suppose it was true!

Clad in overalls, gloves and breathing apparatus and armed with a seven foot long hook devise I attempted to retrieve the offending bags with little success. The bags were too well incorporated into the conical pile of detritus.

All I succeeded in doing was tearing a couple of them open. A few days later, similarly attired, I tried a new strategy. I hosed the mound with my fire pump on the theory that I would soften and break up the more solid matter and float the bags to the top. This worked moderately well, and I was able to hook out pretty well all of the bags....like extremely repugnant, bloated fish.

I then printed a couple of signs telling people not to drop their rubbish down the pit toilets. Since putting these signs up in the toilets I have had little other trouble and should see the season out despite extremely heavy usage. 1989 could be a different story unless the actizyme I have on order lives up to my expectations.

The problem with the Fruitbat toilet may be solved later this year when the toilet will be moved to slightly higher and hopefully dryer ground.

My toilet troubles are being sorted out, although with from 50 to 70 people per day using the two toilets at Eliot Falls I'm beginning to wonder if a different system will have to be looked at in the future.

Happy pit peering
Danny Chew.

PARK DEVELOPMENT STANDARDS

Walking Track Construction and Maintenance Standards

Introduction

Ever since National Parks came into being, over eighty years ago, the standard of the National Parks walking tracks in Queensland were one of the best track systems in the world.

It is my belief, that the high standard that once was has now deteriorated. The question may be asked, why? Has the old track constructors gone without passing on the knowledge or not leaving behind them, records to be passed on.

Has financial restraints had anything to do with the problem? Or has modern technology taken over so much that the present staff have lost the enthusiasm to use a pick and shovel.

If our policy is preserving National Parks as far as possible in their original state, and giving right of access to those people who enjoy the peace and quietness of Australia's natural environment, then why don't we do something about it.

In concluding, lets bring back the high standard that once was, and be proud to be part of Queensland National Parks history, work hard, and show the enthusiasm that our pioneers had, who have long gone and have left nothing but monuments and memories.

Goal

If we are going to use our walking track system as a tool of management within our park system in our region then our goal should be from the year 1988 to 1992, is to bring our present walking track system back to, or near as to their original standards.

If there are any suggestions of creating new track systems then these should be thoroughly investigated, because how many times has it been seen, that mistakes have been made, which leads to a track being abandoned or falls into that category of what a waste of resources and money.

N.J. Abbey
Regional Overseer
MAINLAND ESTATE

TECHNICAL NEWS - FACILITIES

Walking Track Maintenance

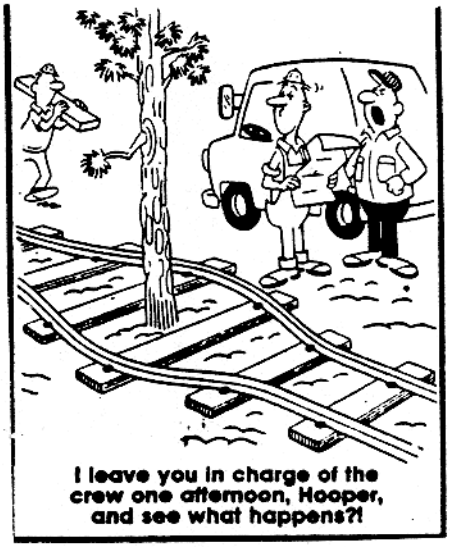
Without regular maintenance all tracks, walks and routes eventually turn into erosion gullies of miniature Grand Canyon proportions. How quickly to slowly they develop has been seen to depend on a large number of criteria, the only element of which we have complete control is the speed and the quality of the maintenance carried out.

Maintenance is not a necessary evil - it is more important than the original planning routing and construction. The less intensive the original planning and argumentation the more intensive the maintenance, monitoring and work will have to be. The amount of work, finances and labour to be invested into any walk track or route, in a maintenance program will be found to be directly proportional to original design, usage, terrain, topography and climatic conditions.

Supervision
As has been stated the quality of on site supervision will have a distinct effect on new construction or maintenance. Preparatory to any work being carried out, supervisors should have been involved in consultations with Planning and Policy makers on the tracks future. Supervisors must also be made aware of any financial constraints so that an appropriate maintenance program may be drawn up.

Supervisors should be forceful in their efforts to see that tracks are not, constructed in such a manner as to create a maintenance problem, but rather to see that construction is such that it facilitates or reduces maintenance as much as possible.

Aesthetics are an important consideration in track planning and design but supervisors should also point out practical as well as cost effective methods of construction and maintenance program.



An example of aesthetic Vs practical consideration

Inventory
Track monitoring is greatly assisted if a full and complete inventory of track conditions and usage exists. Surveys of heavily used tracks will assist in planning for improvements or in track reclassification. Comparisons of successive condition surveys with the inventory notes, photos or observations of long serving officers may help in planning sometimes long 'overdue' maintenance programs.

Condition Survey
Monitoring is perhaps the most neglected aspect of most maintenance programs. If there is little or no information on damage, erosion, misuse and effects on vegetation then there is no basis for planning or carrying out of any maintenance programs.

Suggested is that condition surveys be carried out in much more closely spaced intervals than those recommended, particularly for those tracks where difficult climatic conditions prevail. Monitoring combined with prompt and effective early maintenance is far more cost effective than major maintenance and revegetation programs. For example:
Grade I Walk - Check biannually
Grade II Track - Check annually (preferably after heavy rain)
Grade III Route - Check annually - again after heavy rain.

The only result of the neglect to sufficiently monitor track conditions, usage and damage is to increase the incidence of misuse with the resultant erosion, vegetation and geological damage.

Maintenance
Think big! Maintenance should not only be a stop-gap. Don't be prepared to do the same maintenance works every year.

If you find yourself in this situation then upgrading the track with major works may be far more cost effective than trying to patch up the same sections year after year.

The aims of maintenance should be:
1. To maintain or improve walking surfaces as situations dictate. Make walking on track easier than stepping off it.

2. Stop erosion - probably the greatest single cause of misuse and ultimate track failure (I was once told there are 3 main points to remember when designing walking tracks - DRAINAGE, DRAINAGE and DRAINAGE).

3. Repairs, revegetation, rehabilitation. There is no point in proceeding with these items until a track of sufficient width and walking comfort has been constructed.

Common problems
Tracks constructed with 'WINDFALL LABOUR' and associated financing and then, discovering you don't have sufficient labour or finances to maintain the tracks in their original condition.

Tracks or routes where usage has increased or out stripped expected usage, thereby forcing unforeseen upgrading (monitoring important).

Tracks with poor alignment and grades short cutting.

Be practical
It is far better to quadruple the initial construction costs than to 'doing it on the cheap' and end up paying out for maintenance 1,000 times more than the initial costs.

Tracks should be constructed to facilitate maintenance not to hinder it. It may be advisable to construct some tracks to allow limited vehicular access for maintenance purposes. eg. trail bikes or small dump trucks. Insufficient liaison between supervisors and those 'decision makers' who decide on land management objectives, available funding and possible track reclassification.

Insufficient use of modern technology in the form of track surfaces, fastening, machinery and transport will in the long run raise construction costs. As much use of maintenance free materials as possible should be the aim of every supervisor in an effort to reduce the number of items requiring annual maintenance. Failure to adhere to the above policy will necessitate annually larger and larger maintenance programs, finance for which may eventually not be forthcoming.

John Moye

TOADS ON ROADS

UK – Numerous groups here have worked over the last few years to protect populations of toads where they cross busy roads. In addition to arranging toad warning signs, at some sites low fences have been built alongside the roads to channel the animals towards collecting points. Each site is supervised by local volunteers responsible for picking up the amphibians and transporting them safely across.

National Transport Authorities in England and Wales have since given official sanction to the warning signs. Selection of appropriate sites depends upon the size of the local amphibian population, the direction in which they are moving, the most intensively used routes, the mortality rate, the amount of traffic using the road, and the width and nature of the road, which could prove as dangerous to the volunteers as to the animals.

Since the instigation of the Toads on Roads campaign in 1984, over 200 toad migration sites have been approved for toad warning signs in the UK. Systematic recording of data by the volunteers has provided valuable ecological information. Their efforts in creating regional networks of interest demonstrates how local interests can have national impact. Similar signs for amphibians have been used in West Germany, Switzerland and the Netherlands since the late sixties and early seventies.

In an exemplary gesture of industry support, funding for the project has been contributed by a polymer products company, which has designed under-road plastic tunnels for the toads' passage.

TOADS ON ROADS BROCHURE

WILDLIFE NEWS

The Cairns Post, Wednesday, November 2, 1

White rhinos slaughtered

NAIROBI, Kenya (AP) — Poachers gunned down at least five white rhinoceroses, killing off the species in Kenya's public lands, and made off with the animals' valuable horns after a gunfight with park rangers, authorities said.

Two rangers were seriously wounded in the battle with about 30 poachers on Sunday night at Meru national park, 225km northeast of the capital Nairobi, according to yesterday's English language newspaper, The Standard.

The poachers escaped after hacking off the rhinos' horns, which can sell for up to $A29,176 each in the Far East, where they are used to make traditional medicines.

Thirteen elephants were also gunned down in the past week in different areas, bringing to about 150 the official number killed since April, although wildlife officials estimate the toll is much higher.

Kenya sent a paramilitary unit to Meru national park to track the rhinos' poachers, a Government wildlife source said.

The killings came despite increased anti-poaching efforts by the Government since August, when the Minister for Tourism and Wildlife, Mr George Muhoho, revealed the slaughter of 92 elephants in the previous three months.

The white rhinos, unlike the black rhino not indigenous to Kenya, were imported from South Africa about 20 years ago to start a colony and lived under guard in a special reserve in the park. There are still an estimated 30 to 40 white rhino on private ranches in Kenya.

Pandas at risk

HONG KONG (Reuter) — China's giant pandas are still in danger of extinction despite an eight-year $A36.63 million conservation program, an official of the World Wide Fund for Nature said yesterday.

"If present trends continue, the panda is under a very severe threat of extinction," the fund's chief China conservation officer, Mr Chris Elliott, told a news conference in Hong Kong.

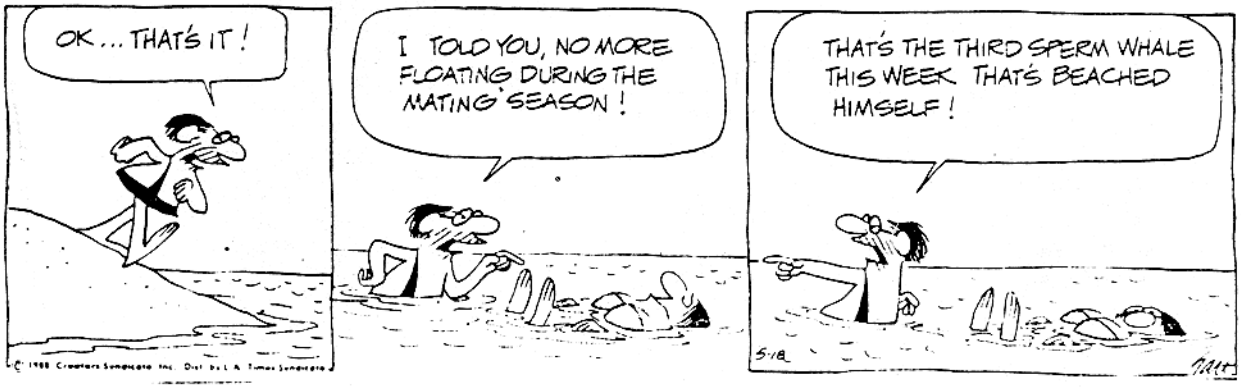
"What we have done so far is not sufficient."

The animals are threatened by humans encroaching on their habitat, the periodic flowering and loss of their staple food, bamboo, and increasing poaching for their skins, he said.

Whale a plus

PUBLICITY surrounding a 8m minke whale which strayed 50 km up the Kennedy River in Far North Queensland last week could have long-term benefits for tourism, State Tourism Minister Geoff Muntz said yesterday.

The whale's presence last week created a greater awareness that these leviathans of the deep were attracted to Queensland waters, Mr Muntz said in Brisbane.



Flying foxes for harvest

WHAT is considered a pest now could turn out to be the centre of a lucrative export market for Far Northern primary producers.

The flying fox has been a problem to many a fruit grower, but a proposal studied by the State Government as a possible alternative industry to tin mining and timber milling could reap $5 million annually for the Far North's economy.

Two years ago, Mr Bob Mutton, the then chairman of the State Chambers of Commerce, was commissioned by the Employment Minister, Mr Vince Lester, to conduct the study.

Apart from herb processing, native plant propagation and private universities, he said one of the options considered was flying fox harvesting.

Mr Mutton said there was a huge market in the Middle East, Asia and the South Pacific for flying foxes which were considered delicacies in those areas.

He said the Government's recent move to lift protection for flying foxes had made the proposal of harvesting the mammals a viable one.

"People would not be allowed to shoot them, but they could be easily caught with a net and killed observing the rules about cruelty," he said.

"The DPI (Department of Primary Industry) have done a lot of research into this area."

Mr Mutton said the animals would be accepted overseas either frozen or dried in oil, as mutton birds from Tasmania were processed before export.

"It's only one of the possible industries that could take over from tin mining and timber milling, but it is such a good one because the pest of the past can now be a product of the future," he said.

The findings of Mr Mutton's study into possible alternative industries will be presented to Mr Lester within the next three to four weeks.

Flying foxes

AS a biologist working on flying foxes, I'm horrified about the decision of the Johnstone Shire Council to allow Mr Mick Tabone, permission to capture flying foxes to use as crocodile bait (26-8-88).

While I'm sure that many residents of the area adjacent the Innisfail town swamp would feel that flying foxes were a general blight on the neighborhood and that their destruction was warranted, this perception arises from sheer ignorance of the role of fruit-bats in the Australian environment, and in northern Queensland rainforests in particular.

As Johnstone Shire Council has been a leading light in its support for World Heritage Listing of its environment, it should show an equally enlightened attitude to one of the animals which appear to be responsible for the pollination and dispersal of a great number of rainforest species, and without which, some researchers claim, rainforests would be poor shadow of those present today in regard to species richness.

Destroy the flying foxes, and you run the very real risk of seriously degrading the asset that you wish to have protected by WHL.

Besides, if Mr Mick Tabone really wants live bait, he would be better advised to use chickens — they are a damn sight easier to catch. — **(Dr) Hugh Spencer, Cape Tribulation Field Study Centre.**

MR Tenni's policy of trapping "dangerous" crocodiles has proved to be a policy of extreme cruelty.

They have the choice of being baked alive by the sun, or drowned when caught in unattended nets or condemned to a slow death in a poorly designed pen after "relocation".

On an average day at least 500 people cruise the Daintree River, so it must be obvious, even to Mr Tenni that people wish to see crocodiles in the wild.

Please leave them alone and let the people who live with them decide the fate of the dangerous ones. It's far more humane than Mr Tenni's method. — **Dean Clapp,** Daintree Connection, Crocodile Express, Daintree Butterfly Farm.

A goliath frog alongside a falcon for size comparison.

The largest frog in the world is the rare Goliath frog (*Rana goliath* = *Conraua goliath*) of Cameroun and Spanish Guinea, West Africa. On 23 August 1960 a female weighing 3·305 kg *7 lb 4½ oz* was caught in the cataracts of the River Mbia, Spanish Guinea. According to Dr Jorge Sabater Pi, (pers. comm. 15 August 1967), Curator of the Centro de Ikunde in Bata, Rio Muni, this monster had an over-all length of 815 mm *32·08 in* and measured 340 mm *13·38 in* snout-vent. An even larger female with a snout-vent length of 356 mm *14·01 in* was collected by Dr Zahl (1967) in Spanish Guinea in December 1966 (now preserved in the National Geographic Society, Washington, DC), but this individual weighed 3·1 kg *6 lb 13¼ oz*.

Weights up to 5·89 kg *13 lb* and snout-vent lengths up to 609 mm *2 ft* have been claimed for this species, but Dr Sabater Pi considers these figures to be exaggerated.

The largest toad in the world is the Marine toad (*Bufo marinus*) which – thanks to man – is probably the most widely distributed amphibian living today.

An enormous female collected at Miraflores, Colombia, on 24 November 1965 and later exhibited in the reptile house at New York Zoological Park (Bronx Zoo) had a snout-vent length of 238 mm *9·37 in* and weighed 1302 g *2 lb 14 oz* shortly before its death. (Dr Hutchinson, pers. comm. 5 October 1967.)

A Marine toad with a Common toad on its back

MAN'S BEST FRIEND

Be kind and tender to the Frog,
And do not call him names,
As 'Slimy skin', or 'Polly-wog',
Or likewise 'Ugly James',
Or 'Gape-a-grin', or 'Toad-gone-wrong',
Or 'Billy Bandy-knees':
The Frog is justly sensitive
To epithets like these.
No animal will more repay
A treatment kind and fair;
At least so lonely people say
Who keep a frog (and, by the way,
They are extremely rare).

HILAIRE BELLOC

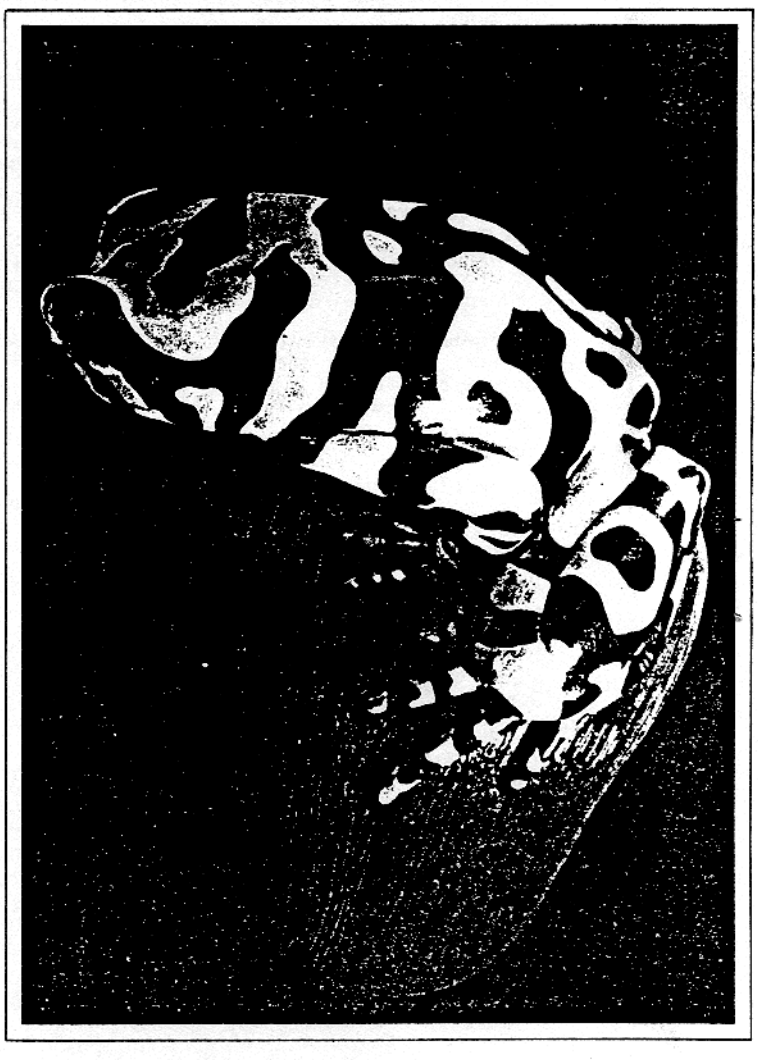
THE USEFUL FROG

A species of South African frog, the plantanna, was until recently used so extensively in pregnancy tests that it became threatened with extinction. To perform the test, 2.5 cc of chemically-treated urine would be injected into the adult female frog. If the woman was pregnant, the frog would lay thousands of eggs within six to twelve hours. If she was not, there would be no eggs. The success rate of this experiment created an enormous demand for the plantanna world-wide, and many South Africans made a living by netting them. In 1962 alone 13,000 frogs were exported to the United States. Luckily for the plantanna, alternative means have now been found for testing.

Frogs can also provide men with deadly weapons. The Cuban arrow poison frog is not only the world's smallest amphibian, with an average length of only 10 mm, but also secretes a deadly venom. The Cuban Indians used to extract this poison and dip their arrow tips into it before shooting at their enemies.

The frog is a very useful pet to keep in any garden, being a good indicator of weather. If its skin is pale yellow, it will be fine, but if it turns a dark greeny-brown, it means rain. The frog is also excellent for pest control because it feeds on insects which devour plants.

It is easy to keep your garden frog content. All it requires is a pond and a mate. It is difficult to keep a frog indoors because it must be fed on live insects, but with perseverance you can tempt one inside by holding small pieces of meat in front of it.



Incidental fauna and flora surveys

The Incidental Fauna Surveys commenced in response to requests from park staff for assistance in identification of animals observed or collected by them or brought into the office by the public. It was impossible for research staff in the regions to do fauna and flora surveys on parks (even though many of us would have liked to) because there were commitments to such major projects as waterfowl, crocodiles, rainforest, sea turtles, vegetation mapping and the evaluation of land for the Service estate. When it was possible to visit parks in the course of this work, researchers were able to help. Unfortunately, only a very few parks were visited as most of the research studies were in areas where parks did not occur. It would have been great to form a special unit to carry out survey work on parks; however constraints on finance and staff did not allow this to happen. Discussions with senior officers indicated a need for park staff to become familiar with the fauna, flora and landscape provided it did not interfere too much with day to day management. It was felt that by collecting the information in a prescribed form, park staff would benefit by knowing what was on the park and also be able to notice any major changes which may occur. Collecting information would also benefit park planning and minimise problems associated with incorrect decisions based on poor knowledge of the local plants, animals and landscape.

We realised the records would be extremely valuable provided that information on habitat and location were recorded correctly with the observation or specimen. In maximising the value of these records it was necessary to standardise the information collected. A handbook was written by myself and John Winter and a pilot study conducted on several parks. Modifications were made to the handbook from the suggestions received from park staff. A three tier level of information required was adopted because of the varying levels of ability and knowledge of the information gatherers. The first level was the minimum information needed or else the record would be worthless. The other levels required more information but also gave results which had greater application to park management and planning. It was also appreciated that records would be irregularly collected because of commitments to other duties.

The existence of the handbook was 'advertised' in Ringtail and then distributed to those who wrote in or who I contacted on a trip to various Districts and Regions explaining the scheme. The response has been patchy. In the northern areas of Queensland,, parks such as Lawn Hill, Chillagoe, Palmerston, Whitsundays and the Mackay District have demonstrated positive interest. Other areas appeared not interested and I can only assume that recreation management of camp/picnic grounds receive top priority with minimal interest in management of the natural components of the park. I may be a bit harsh in my judgement but it seems strange to me that some parks put aside a day a month to do IFS work and read or seek out the literature coming in a fauna, flora and landscape while others offer an excuse of 'too busy' because of commitments to facilities.

For those who did become involved the results have been most gratifying. Initially, we put together what we know about the park from the literature and the knowledge of the staff. Data was then collected with special species being given particular attention, while at the some time we built up a knowledge of distribution and habitat preferences of more common species. This process has helped with interpretation, especially in developing species lists for the public and having staff who are able to talk about the animals and plants on the park.

For those involved in the scheme there have been benefits to their park management and planning. To me, it has been a delight to assist and learn from staff who have taken the time (some in their own time) to care enough to put in the effort. Their concern and interest for the natural elements of the parks has been most gratifying.

Keith McDonald.

IN PRAISE OF THE FROG

Frogs sit more solid
Than anything sits. In mid-leap they are
Parachutists falling
In a free fall. They die on roads
With arms across their chests and
Heads high.

I love frogs that sit
Like Buddha, that fall without
Parachutes, that die
Like Italian tenors.

Above all, I love them because,
Pursued in water, they never
Panic so much that they fail
To make stylish triangles
With their ballet dancers'
Legs.

NORMAN MacCAIG

What a wonderful bird the frog are –
When he stand he sit almost;
When he hop, he fly almost.
He ain't got no sense hardly;
He ain't got no tail hardly either.
When he sit, he sit on what he ain't got
almost.

THE MEXICAN FROG

PC Database System for IFFS

A database management system to hold and analyze records collected during Incidental Fauna Surveys has been developed in conjunction with Alison Davis, a Masters student at James Cook University.

The original conceptual development work was carried out by Research and Planning Branch researchers and JCU computer centre staff in the late 1970's. The December 10 computer mainframe was used in conjunction with the 1022 Database Management System and the Fortran Programming Language to process formal fauna survey data. This proved too expensive for the poorly funded IFFS project so it was decided to develop a system for the IBM or compatible personal computers. The design was developed for use by people who have little or no experience with computers as well as to reduce costs.

The programs are written using the database III plus data management system. The programs will be compiled to increase processing speed. When these are compiled copies will be distributed to Districts/Regions which have access to computers. Trials for the usability of the programs are being conducted at Eungella National Park and the Whitsundays.

It is expected that PC's will eventually become a part of the normal equipment in District Offices within the next five years. They already exist in Regional Offices. The computers can be used not only for database management for fauna surveys but also for permit records, word processing, financial accounting, tourist statistics and tourist information.

Since receiving this article the programs have been compiled. Discussion with park staff has given some idea of the information needed from the database. Report programs to meet these requirements will be finished by the end of November.

K.R. McDonald
R & P Townsville

Species Lists for parks

Species lists of vertebrates and dominant plants have been used frequently in park interpretation. They are also used as a starting point by park staff for management.

In recent times we have had to check the authenticity of these lists and in doing so have encountered some persistent problems. This has slowed the production process down considerably. The following are a few points to keep in mind as you compile your list.

Do what you can with the current level of knowledge you possess. You may need to collect voucher specimens with the plants while most large vertebrate fauna can be identified from careful observation. Smaller fauna such as reptiles, frogs, fish and insects may require a specimen or very good photograph for identification.

1. **Source and reliability of the information**
   When compiling species lists the skill of the person making the identification must be taken into consideration. All sightings need to be checked. If someone comes into the office and gives you a list of fauna or flora make sure the person gives a name and address so that you can make contact about anything which occurs on the list which has raised doubts as to its identity. Try to determine, politely, the experience of the person and thus get some idea as to the reliability of the information. Some lists I have had to assess have had up to 5% error. One had birds that were 500 to 1 000 km out of the known range. Others have had definite rainforest species in open woodland parks. There wasn't any rainforest on the park!

   The motto I have taught to people involved in incidental fauna surveys is 'IF IN DOUBT LEAVE IT OUT'. If an animal or plant is not expected to be in your area by a good distribution map, leave it out until you can get a specimen or good photograph identification or an expert to identify it for you. You can always add it in at the next revision if a new record.

2. **Standardisation of name and sequence**
Make sure your lists follow a standard order. Use the sequence and names of the RAOU Atlas of Australian Birds, Complete Book of Australian Mammals, Cogger's Amphibians and Reptiles of Australia and the plant names used by the Queensland Herbarium, Flora of Australia or Queensland Plants.

3. **Habitat and status**
Naturally, being the manager of a park you will have some idea of the broad habitats of the park. For example, you could use broad categories such as rainforest, open forest, woodland, grassland, seashore, reefs, mangroves, freshwater swamps and lakes and so on. Use structural descriptions that the general public can readily recognise. Don't go into plant species alliances. Having divided the habitats into groups, it is a simple matter to relate animals and plants to their habitats.

We use, where the information is available, a simple status code for birds.

R Resident - seen in all seasons

M Migratory - distinct seasonal movement example, Waders, Torresian Imperial Pigeons.

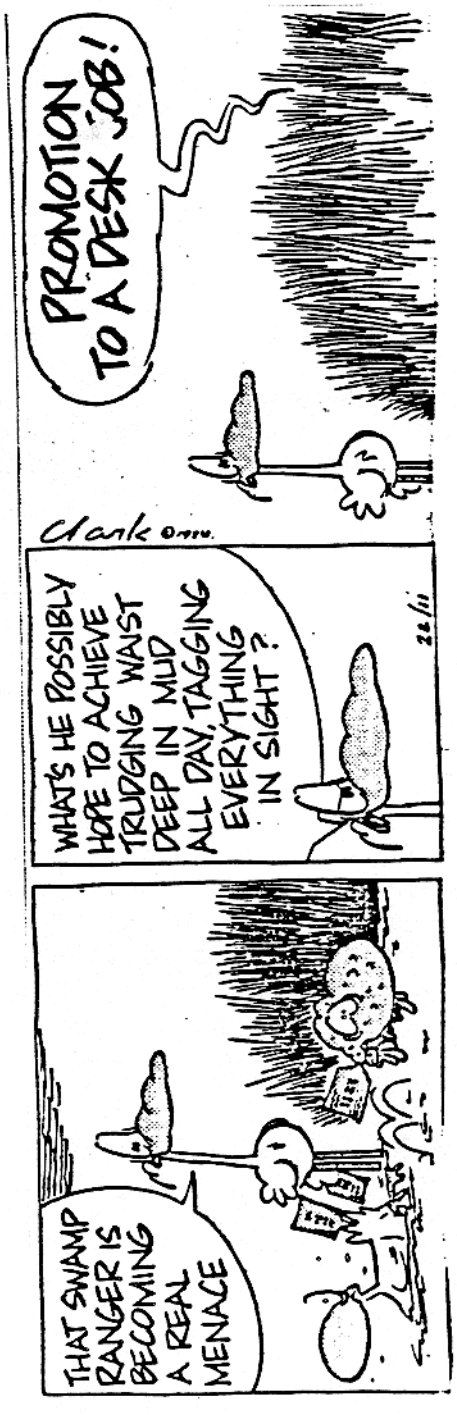
O Occasional - species which are seen infrequently. These may come with specific flowering plants and may not be present every year; vagrants may be blown in; or species of which we are unsure at this stage of our knowledge.

Complicated systems create problems. We did try a more complicated system describing nomadics, vagrants, migrants (winter and summer) etc but this became so complex to be unworkable. The best solution is a set of simple categories such as that recommended for birds. Similarly simple categories can be used to describe seasonal flowering of plants (flowering, non-flowering) or seasonal activity cycles in reptiles (active, non-active). Please bear in mind that what the status situation is in one area, may not necessarily be in another. General status information from field guides may not apply to you park.

At first you may find that a number of species going into the occasional category is high. This just reflects our knowledge and undoubtedly in time some animals will change to resident status. The same applies with the number of habitats which the plant or animal uses. Should you wish to see the design of a species list with habitats and status obtain a copy of the Lawn Hill bird list.

It is the compilation of many sightings over time that makes the list a reliable and accurate accounting of habitat use and species status of our fauna and flora.

K.R. McDonald
Senior Research Ranger



Incidental Fauna Survey

This is an exercise that all National Park officers should make time and become involved.

At basics, IFS is the casual observation of fauna put on record. In depth, an extension of IFS is simple - it becomes more than a casual observation where regular visits are carried out into a habitat to count and observe changes in numbers of a particular species.

But why both?

Why bother breathing?

Look! These records can be extremely valuable in establishing records of birds and animals of your area and the type of habitat they prefer. Being able to recognise the habitat and then the fauna are all part of your park knowledge and lead to competent interpretation of what is going on outside the garbage bins and dunnies.

Ask yourself another question!

Whats the point of a record?

Essentially it is a written document, for all time.

The IFS has a record sheet designed to collate the information in a standardised manner so entries can come from any observer over many years.

Its an ongoing gathering of facts, a wealth of 'nitty gritty' if it comes to a showdown on major development that would threaten the well being of a particular park dweller, or a vegetation community. What better facts could support the National Parks objectives -

'To foster harmony between man and the environment, thereby facilitating the well-being of humanity, and safeguarding the integrity of nature'. Tourism is on the move in Queensland, do your park a favour by creating reliable records to control the commercial avalanche.

Start gathering entries and be consistent.

Simplicity will help to keep records

At Lawn Hill I keep several field data sheets operating. Each has a heading for the particular fauna that that sheet covers. This method makes information entries so much quicker.

Example. A particular possum has its own sheet and each sighting is entered along with location, date and all relevant ingredients.

A sheet on 'Ferals' covers an estimate of Cane Toads destroyed monthly, the success of pig traps and cage traps.

Another sheet specifically for a particular Bat at a particular location is the simplest to fill in, with only the date and species numbers that change on monthly visits.

A sheet relating to 'mammals in general' show sightings of irregular visitors like the Northern Nail-tail Wallaby, or more common bats that slow down long enough for identification (mostly they need catching), the seasonal crusade of flying foxes and the success of elliot trap lines.

A sheet for Reptiles that can be positively identified, with notes on size and behaviour.

A sheet specifically for 'freshwater crocodiles' - a monthly survey is carried out on the most visited waterhole with results already dictating alternatives be assured for freshwater crocodile habitat.

Birds are difficult at Lawn Hill, a virtual drive-in aviary, where it would be both impractical and overbearing to spend countless hours on field data sheets. Instead, the bird list has been cunningly rehashed to show species and habitat symbols. One of these sheets is used each month and as the month progresses the seen species are simply ticked, with the habitat symbol circled; any notes on numbers are made and new records added.

Circumstances at Lawn Hill allow this to be a successful method of recording the immediate Campground, Headquarters areas and the sightings outside the developed area are noted against the corresponding bird species.

It really is easy, I have identified particular species that need a watchful eye, and others that can compete with the changes and pressures that us humans thrust upon their homes and food supplies.

On the flora side of this matter, start gathering samples for an on Park 'Herbarium'. You will find it powerfully interesting, your knowledge of the local flora will expand greatly. It will be a welcome source of information for future park staff.

At Lawn Hill we are now working on Plant Communities, which will directly tie in with the fauna that are dependent on, and complete that community, giving weight to overall IFS.

If I have stirred 'your possum', and you need to learn more on how the records are made and kept, contact the man who put it together - Keith McDonald, Pallarenda Townsville.

Colin O'Keefe

I'm a Nobody! who are you?
Are you – Nobody – too?
Then there's a pair of us!
Don't tell! they'd advertise – you know!

How dreary – to be – somebody!
How public – like a Frog –
To tell one's name – the livelong June –
To an admiring Bog!

EMILY DICKINSON

Mount Spec - An Incidental Fauna Survey in Progress

Two and a half years and 1 200 incidental fauna survey records later I can look back on my stay at Mount Spec with the knowledge that there will be a data base providing information on the distributions and seasonal abundance of a variety of beasties from the butterflies through to the mammals.

At present, the role of the IFS data in management decision-making at Mount Spec is minimal. Luckily however developments and visitation to date appear to have had little, if any, effect on the status of the wildlife on the park (that is, the species lists read more like checklists!).

So for the present the information gained from the IFS has been channelled into other areas, benefitting park interpretation, research and public information (not to mention providing a wealth of training in animal identification and natural history). Hopefully, future management will include IFS data in its forum.

To date, the data has been most useful for providing information about where certain animals have been regularly found - particularly on the walking tracks. This has allowed a 'Harry Butler' type approach to be adopted on guided walks. Species of Microhylid frog and even undescribed and rare skinks could be introduced as conversation topics well in advance of 'the spot' where a casually overturned log would expose the creature in question - a little 'interpretive magic' goes a long way.

As the name aptly suggests, most of the records made at Mount Spec were truly incidental. Here fauna survey techniques include mowing, track maintenance, toilet cleaning, septic unblocking and unforgettable rubbish runs. Nets, traps and other paraphernalia gathered dust as rubbish bins, road kills and rotting log hideaways revealed a wealth of records. A warm road on a wet night rivals any trapping method for the capture of reptiles and frogs.

Over a 100 mammal road kills were documented in the last 2 years including two species of rat previously not recorded on the park (one an extension of its distribution by 60 km).

Of the skinks, records of an undescirbed species, two extensions of range (one by 200 km) and a variety of rare and colourful species were found (including a white-headed, black-striped juvenile burrowing skink - with a bright orange belly no less).

The birds were already a subject of much local interest with IFS records adding information about nest locations, seasonal distributions and migratory movements.

The local rubbish dump - the inevitable end of every rubbish run, provided another source of information. Here, local dingoes marked their territories with their droppings from which identifiable be bones could be extracted. Bush rats, melomys, white-tailed rats, swamp rats, bandicoots and pademelons were not devoured in vain - their memories linger on as charges on a floppy disc somewhere (such is death?).

On the whole, the program ran very well at Mount Spec, just as it should on any park, and I hope that the articles in this review will generate more interest in the 'upper regions' of the state.

Finally, one conclusion which is worthy of note has come to light from visiting and working on a number of parks. With many parks being gazetted for 10 or 20 years it would be expected that their biotic components would have been adequately documented. But this is not always the case. Apart from the Keith McDonalds and the curious park workers NO ONE IS ACTIVELY LOOKING FOR NEW RECORDS OF THE PLANTS AND ANIMALS ON OUR PARKS. There are still many new and interesting records to be made and the animals are just out there waiting (hopefully to be discovered before a new picnic ground is developed on top of them). With this in mind I hope a few of your border-line cases join the ranks of the jolly IFS-er. Happy hunting possums!

T. Brumby
Townsville


SIMON ©

Frogs as a Life Style

by Glen Ingram

Illustration by Simon McLean

I recall with pleasure the many cloudy, hot, moist nights I have spent under the glamour of the frog. These are memories hard earned in swamp, creek, bog, lagoon, and runlet, but treasured for the pure beauty and sensuality of the frog. I have seen creatures of bright and delicate hues; I have seen wondrous forms saltant; I have heard love-songs trilled and whistled from many ornate vocal sac. But most of all, I have experienced again and again that exquisite pleasure of the naturalist — the satiation of the pique of curiosity.

(Have *you* heard the satanic shrieks of the Orange-eyed Treefrog? Had your ears tintinabulated for days because of the call of a Bleating Treefrog? Has your tape recorder been blasted off its register because of a Dwarf Rocketfrog? Have you seen an animal that carries its young in its stomach? Have you seen a frog that carries its young in hip-pockets? Have you lived??)

You can always pick frog-watchers in a crowd of naturalists. There is a spring in their step; they are happy-go-lucky and give impromptu renditions of frog calls at the most surprising moments; and they smile a lot when it is overcast. The dark, and dank, and the moist are grist to their mill. While dude naturalists are ensconced in their tent because of the vicissitudes of the weather, frog-watchers are in full flight pursuing huge choruses of breeding frogs. The alert reader will have noticed a complete philosophy of life hidden in the foregoing. It is this: when times are good then things are good, but when times are bad, it is even better. If everyone learnt this small maxim of the frog, the world would be a better place.

Moral lessons like this are no surprise to a frog-watcher. Very soon into my metamorphosis from dude naturalist, I realized these philosophical mots were no accident. Unfortunately, it was years before I grasped the secret as to why this was so (bird-watching arrested my development for a period). The turning-point was the Brisbane Wildlife Survey. The organizers talked me into running frog-watching outings. After the first three trips, I noticed an amazing coincidence. The more species of frogs I found, the less the number of people who arrived, and *vice versa*. Expressed mathematically, the number of people (P) was inversely proportional to the number of species of frogs (F).

$$P \propto 1/F$$
$$P = X/F$$

where X is a constant.

I called X the "Universal Frog Constant" or UFC for short. With data from my first two outings (P = 16, F = 15 and P = 34, F = 7), I knew X probably equalled 240. The third outing at Mt Coot-tha was to be the test. Before the start, I scouted the area for frogs and found only three species. Therefore P = 240/3 = 80 people!

I knew then and there the "Universal Frog Constant" was a pipe-dream. Eighty people do not turn up to look at frogs, and the UFC, if it existed, would not be so cruel as to force eighty people to come on my worse night — only three species of frog, one of which was a Cane Toad!

The night is still vivid in my memory. For three-quarters of an hour past the starting time, I sat hidden on a ridge looking down on masses of cars, several television vans, and a host of hostile torches. I decided to change the UFC to the "Coefficient of Embarrassment".

In time I lost my animosity towards the UFC and I realized the importance of the discovery. Since then I have used it many times to amplex with life, thus making existence comprehensible and accessible. But one thing eluded me — what did the UFC mean? I knew it worked but why?

About three weeks ago I solved the puzzle. Then I realized what I had known all along. Frog-watching was not just an enjoyable pastime, frogs are a lifestyle. Serendipity came about thus . . . I was reading a book on the predictions of Nostradamus and I was particularly impressed with the way the author unravelled a couplet (the prophet was very wily in hiding the meanings of his prophecies). The author had just shown that "parinza" was an anagram of "Napoleon", when it struck me that I must use the same techniques to unravel 240. I saw then that 240 was 10 times 24 and, you probably have guessed too, 24 is an anagram of 42! 42, the answer to life, the Universe and everything! The meanings of 240 were crystal clear. I saw two important ones.

1. Although people think frog-watchers are somewhat backwards, they actually make ten times the contribution to society.

2. If we bend over backwards and achieve at least ten percent of the population frog-watching, the world will be irrevocably changed for the better.

There are many others but 240 is a personal experience and its secrets are now yours to use for a better life.

Philosophy aside, there is practical value to frogs as a life style. They make excellent companions and perform useful roles. Green Treefrogs are superb mousers (I kid you not). A pond of frogs adds sonic pleasure to gardens and helps recalcitant neighbours to shift. Frogs on indoor plants decrease your reliance on pesticides. And most of all frogs make excellent watch-dogs. Even the most fearless intruder will have apoplexy it he stands on one.

Humour aside, Australian frogs are amongst the most beautiful and interesting animals in the world. Their mating calls are just as pleasing and attractive to the ear as bird song — sometimes more so. Two hundred and forty Australian frog-watchers can not be wrong. □

Forgotten Frogs

Dr Glen Ingram, in Wildlife Survey of the Brisbane area edited by Wally Davies wrote 'Frogs are the most splendid of creatures' but Glen doesn't like frogs he ADORES them.

So frankly do I. I often find myself smiling at those who dub themselves 'Herpetologists' (which should, incidentally, be reserved for the genuine article) and who dismiss frogs as mere 'snake tucker'.

Frogs can be very colourful, some highly variable within the species, many have extraordinarily beautiful 'songs' and most can be easily observed during breeding times given patience and determination.

A good nights frogging with a friend or two can have the same recreational impact as an expensive week's holiday and at little cost.

All that's required are a couple of good torches and a willingness to use eyes and ears. Optional extras include raincoats wellies and a couple of litres of 'Ranger' Ric's special frogging formula (to obtain the recipe for this delectable elixir send stamped self-address envelope plus modest financial donation to me at Southern Regional Office). No, really, frogging provides a fantastic opportunity for anyone to immerse themselves in the workings of mum nature at her most exciting. After all what you're doing mostly is tip toeing through the very private boudoirs of the frogs who are so intent ~~on~~ their determination to procreate their species that they are largely oblivious to the human intruder.

I've had some spectacular thrills as well. The most noteworthy being confronted by the odd snake whose interest in the frogs is of the gastronomic variety.

My interest has largely been in learning about the species their calls, breeding times and all that rot, so identification is important to me though I'd stress it's not the be all and end all. I tend to use Cogger but 'A Field Guide to Australian Frogs' by Barker and Grigg is very useful too.

An appreciation of frogs requires no special talent if it did I wouldn't have any. You learn as you go and you delve only as deeply as you wish. And you learn all the time. Last season for example I finally cracked a puzzle I'd had for years. It related to a little dull brown frog called Ranidella parinsignifera.

These frogs are extremely common throughout their range and anybody who knows anything at all about frogs could have enlightened me about my difficulty if I'd bothered to ask. According to the literature what I was looking at was far too small (about 25% too small) and the call was all wrong. My Ranidellas weren't giving a 'harsh, drawn out squelch', they sounded like a zebbie finch in an empty wheelie bin. See, both

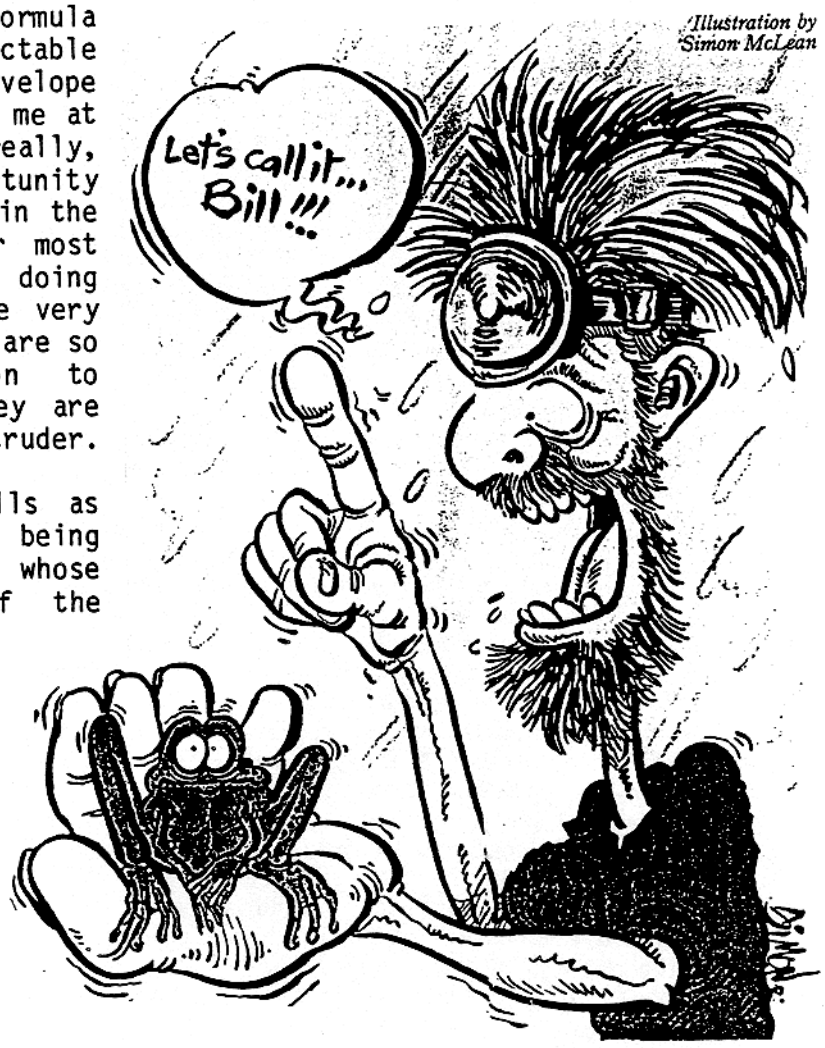


Illustration by Simon McLean

the size and the call are described from the southerly part of their distribution. At higher temperatures frog calls are often higher pitched and much shorter. That was falling penny number one.

The second penny to drop was simply 'Bergmann's Rule' which in it's most scientific form states that 'the ones up here are littler than the ones down there'. About seven years ago I found a frog that made me think I'd had too much Ranger Ric's special frogging formula. It was supposed to be a Green tree Frog but it was bloody sky blue. In his book 'Frogs' Mike Tyler explains the phenomenon but if the sight of a bright blue frog in a pond full of your standard green ones doesn't grab ya - nothin'; will. Yes folks - frogging - try it sometime!! Regards to all in the Far North.

Ric Nattrass

PS. Next edition with Prociv's permission I'll tell you about a praying mantis that caught and totally devoured a frog some 10 times its own bodyweight.

Sounds fascinating - I can hardly wait - Ed.

How do frogs do it?

In Cape York and the Wet Tropics of Queensland there is a group of frogs belonging to the Family Microhylidae (the Narrow-mouthed frogs); all except two are found in the rainforest and in Australia only one other species is found outside Queensland. This family of frogs has an interesting breeding behaviour. The calling male is approached by the female, however when within visual distance, the male hops away a short distance and recommences calling until the female approaches again, and again he hopes away. This continues for some time as he leads the female towards and into a rotten log or some decomposing vegetation such as a staghorn fern. Some might say he leads her up the garden path. Unfortunately no-one knows what happens next. Other frogs in Australia adopt either one of two mating (amplectic) positions. The male gets on the back of the female and clasps her firmly in the armpits (axilla) or in the groin (inguinal) region. The female can then piggy back the male to water or, if they are in water already, bloat herself up and float with him. The amplectic position adopted is the same for all members of the one species. Tree frogs adopt axillary amplexus while most frogs of the Myobatrachidae (Southern frogs) use the inguinal position. The male fertilizes the eggs from this position. Fertilization is external: the female extrudes eggs and the male spreads sperm over them.

Some members of the genus Taudactylus (the Day frogs) use visual cues to signal to one another. Leg shaking, arm waving, head bobbing and 'Charlie Chaplin' hops are all part of their repertoires. The male pouched frog of southern Queensland and northern NSW has inguinal opening brood pouches in which he broods the tadpoles until they are fully developed froglets. During development the most advanced staged tadpoles are closest to the pouch opening. The Narrow-mouth frogs are different from most Australian frogs in that they do not have a free swimming tadpole stage. The thick membranous, large yolky eggs are laid in a moist depression under rotting vegetation or logs. The male may remain with the eggs with his body bowed over the clutch. Sometimes the female is present. In the egg the larval, development progresses through the various stages ;to metamorphosis finally emerging as little miniature frogs, about 5 mm long. The yolk supplies all food during development. Another interesting phenomena of frog reproduction is that exhibited by the gastric-brooding frogs. The gastric-brooding frog's young develop within the stomach of the female; however, the method of fertilization of the large yolked egg is unknown. Fully developed froglets are spat out by the female. She has a mouth which opens more than 90 degrees to eject up to 25 froglets up to 15 mm in length.

There are many other variations in frog breeding behaviour and it is worth the time learning. You can spin a good yarn in an interpretive talk with just a little knowledge. A good introductory book is 'FROGS' by M.J. Tyler, (Collins Natural History Library). Our LIbrarian can get it on loan for you.

The heading of this note originated from R/S Peter Hensler. I thank him for his question!

K.R. McDonald

More scoops than 31 Flavors

Recycled Times

We turn rubbish into news.

Frogs rarely watch T.V... story p. 16

VOL. CCXXMVMIIIV | SEVEN PARTS | LARGEST CIRCULATION | DAILY

EXCLUSIVE

FROGS POSSESS EXCEPTIONAL SENSE OF HUMOR

Frog cracks up over cat's joke.

Bette and her brood beat killer bacteria

FOR 50 years, the cane toad had reigned victorious in the North and just when it seemed the brutes had met their match, they bounced right back into the firing line and waged a full-scale attack on unsuspecting residents of the Northern Territory.

Queensland Museum staff yesterday said in 1986, an epidemic of deadly bacteria called aeromonas, was reported to have been culling the Far Northern toad population.

The disease which caused massive skin deformities, severe blood poisoning and rapid death, was studied in depth by the James Cook University in Townsville and scientists hoped a biological cane toad control would result.

But the dreaded beasts refused to be wiped out and in June they invaded Darwin. A Northern Territory cane toad expert warned the animals could reach Tennant Creek by 1990 — in plague proportions, the museum said.

Earlier this year, the two adult toads were sighted on Moreton Island, which was the last toad-free zone in southeast Queensland and environmentalists feared the toads would seriously threaten many of the island's native animals.

It was suspected the toads had come across from the mainland in building materials for Tangalooma, an island resort.

The cane toad was a poisonous amphibian and a prolific breeder, with the female laying chains of up to 7500 eggs in fresh water in a single breeding cycle, which could happen two or three times a year, the museum said.

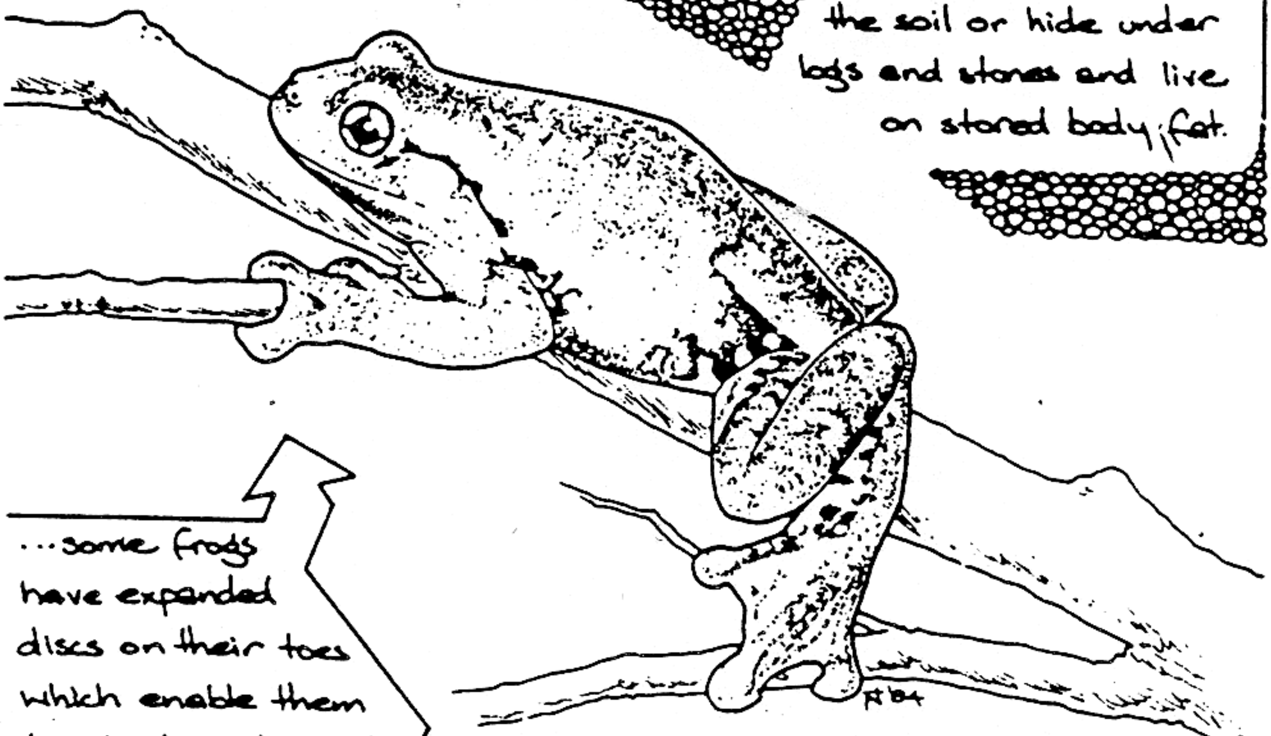
• Pictured in the Queensland Museum library in Brisbane — resident toad, Bette, the second biggest toad in captivity, and museum reference centre officer, Mr Robert Allen. Museum staff said Bette, 22 cm tall (squatting) and tipping the scale at 1.806 kg, had "exquisite" eyes and was named after the famous film star, Bette Davis. — Marshall photo.

Did you know...

...there are 17 species of frog in the ACT. They are protected by law.

...the male of each species has a unique call. In the breeding season these calls are used to attract a mate as well as to help define territories

...if water is scarce some frogs burrow into the soil or hide under logs and stones and live on stored body fat.

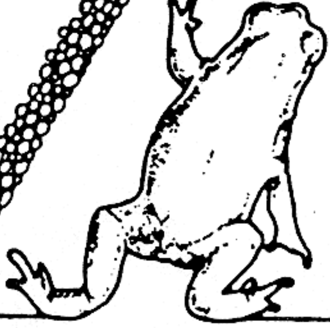


Peron's tree frog

...some frogs have expanded discs on their toes which enable them to climb rocks and trees.

... some frogs secrete poison from their skin

...frogs with short legs crawl rather than hop eg. the common toadlet



... frogs are important in nature as predators of pests, and as food for larger animals.

...many frogs lay their eggs within a jelly-like material which is attached to reeds, sticks and rocks in the water.

A.C.T. CONSERVATION SERVICE

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Produced for children to further interest in the environment

DTLG 16 PR 50 000/4/84(3)

Frogs of the wet tropics and Cape York Peninsula biogeographic regions

Stanton and Horgan (1977) defined biogeographic regions for Queensland mainly based on geology, geomorphology and vegetation patterns. Some years later I attempted to see if there was supporting evidence for the divisions from the distribution patterns of frogs. I compiled a complete list of known records of frogs from all biogeographic regions and national parks and equivalent reserves. The results were remarkable. Nearly all of our knowledge about frogs is restricted to the coastal areas with the best knowledge being in South-east, North-east Queensland and Cape York. For many of the regions (8 of the 13 regions) there was very few records. Formal fauna surveys that have been conducted in parts of some regions, such as those centred on Eungella and Girraween, also accounted for most of their expected frogs. However regions such as the Desert Uplands, the Grasslands,Mulga Lands, North-west Highlands and the Gulf were very poor. The Desert Uplands was so poorly known I could only get one reliable record and that was from a photograph! In addition I tried listing species from individual National Park but found that state wide we were horrendously ignorant of our frogs (and for that matter most vertebrate species) in parks.

The only regions for which there was enough data to be worthwhile were North-east and South-east Queensland, eastern Einasleigh Uplands and Cape York Peninsula. This brief report focuses on frogs of the Peninsula (BR 3) and the Wet tropics (BR 7) Biogeographic Regions (Fig 1) and was compiled to the present time from the literature, museum records, fauna surveys and my own work.

I use scientific names as many species of frogs have no common names. Common names, where they exist, can be obtained from your copy of Cogger's 'Amphibians and Reptiles of Australia' which is in your park reference library.

There is a total of 59 species of native frogs (51% of Queensland's frogs) plus the introduced Cane Toad (Bufo marinus) found in the two biogeographic regions (Table 1).

An examination of Table 2 and 3 show that there is a high level of endemic (41% of total) in the Wet Tropics as may be expected with the topography, high rainfall and the rainforest habitat. However, it is important to note that there are three Cape York endemic which, like the wet tropic endemic, are centred on the rainforest. In this case it is the McIllwraith Range at high altitude. Even more interesting is that these three plus another (Cyclorana manya) are **NOT** recorded from National Park! The three Wet Tropic enemics not in National Park are at least on State Forest where their habitat is adequately protected. The endemic Cape York species do not have this advantage as no State Forests exist in their distribution.

There are seven species of frog found only in these two biogeographic regions which are also found in Papua New Guinea. In Queensland these animals occur in at least one National Park.

Twenty-four of the 27 Queensland endemic species occurring in the two regions are restricted to either the Wet Tropics or Cape York. They are predominantly rainforest species.

Our knowledge of frogs in a number of National Parks is poor (Table 4), especially for Mossman Gorge, Cape Tribulation, Cedar Bay and ALL the Cape York parks. In the Cape York parks such as the Jardine River, Archer River and Rokbey we have, to the best of my knowledge, none or one or two records. Localised species such as Cophixalua neglectus (from Bellenden Ker/Bartle Frere) and C. saxatalis (Black Trevathan Range) have most of their known range in National Park. We have to be aware of geographically localised species so that in making management decisions on the Parks we do not destroy habitat, pollute streams from toilet block seepage or encourage intensive bush camping in fragile areas.

An examination of species distribution in the Cape York biogeographic region shows two components which one has to be aware of as criteria in selecting key areas for

TABLE 1.

SPECIES LIST OF FROGS OF CAPE YORK PENINSULA AND WET TROPICS BIOGEOGRAPHIC REGIONS

Family MYOBATRACHIDAE

Crinia remota
Crinia cf deserticola
Limnodynastes convexiusculus
Limnodynastes ornatus
Limnodynastes peronii
Limnodynastes tasmaniensis
Limnodynastes terraereginae
Mixophyes schevilli
Notaden melanoscaphus
Pseudophryne sp1
Taudactylus acutirostris
Taudactylus rheophilus
Uperoleia fusca
Uperoleia lithomoda
Uperoleia mimula

Family HYLIDAE

Cyclorana brevipes
Cyclorana manya
Cyclorana novaehollandiae
Litoria alboguttata
Litoria bicolor
Litoria caerulea
Litoria dahlii
Litoria fallax
Litoria gracilenta
Litoria gracilenta2
Litoria inermis
Litoria infrafrenata
Litoria latopalmata
Litoria lesueurii
Litoria longirostris
Litoria lorica
Litoria microbelos
Litoria nannotis
Litoria nasuta
Litoria nigrofrenata
Litoria nyakalensis
Litoria pallida
Litoria revelata
Litoria rheocola
Litoria rothi
Litoria rubella
Litoria serrata
Litoria xanthomera
Nyctimystes dayi

Family MICROHYLIDAE

Sphenophryne fryi
Sphenophryne gracilipes
Sphenophryne pluvialis
Sphenophryne robusta
Cophixalus bombiens
Cophixalus concinnus
Cophixalus crepitans
Cophixalus exiguus
Cophixalus hosmeri
Cophixalus infacetus
Cophixalus neglectus
Cophixalus ornatus
Cophixalus peninsularis
Cophixalus saxatalis

Family RANIDAE

Rana daemeli

Family BUFONIDAE

Bufo marinus

TABLE 2.

Native frogs of Cape York and Wet Tropics Biogeographic Regions

Species Name	Qld	Other Aust States	PNG	Wet Tropics	Cape York	Nat'l Park	State Forest	Aboriginal Reserve
QUEENSLAND ENDEMICS								
Mixophyes schevilli	*			#		*	*	
Taudactylus acutirostris	*			#		*	*	
Taudactylus rheophilus	*			#		*	*	
Litoria lorica	*			#			*	
Litoria nannotis	*			#		*	*	
Litoria nyakalensis	*			#		*	*	
Litoria rheocola	*			#		*	*	
Litoria xanthomera	*			#		*	*	
Nyctimystes dayi	*			#		*	*	
Sphenophryne fryi	*			#		*	*	
Sphenophryne pluvialis	*			#		*	*	
Sphenophryne robusta	*			#		*	*	*
Cophixalus bombiens	*			#			*	
Cophixalus concinnus	*			#		*	*	
Cophixalus exiguus	*			#		*	*	
Cophixalus hosmeri	*			#			*	
Cophixalus infacetus	*			#		*	*	
Cophixalus neglectus	*			#		*	*	
Cophixalus ornatus	*			#		*	*	*
Cophixalus saxatalis	*			#		*		
Pseudophryne sp1	*			**		*		
Crinia cf deserticola	*			**	**	*		*
Litoria serrata	*			*	*	*	*	*
Cyclorana manya	*				#			*
Litoria longirostris	*				#			
Cophixalus crepitans	*				#			
Cophixalus peninsularis	*				#			
Subtotal	27			23(20)	6(4)	20	20	5

TABLE 2 (cont).

AUSTRALIAN ENDEMICS								
Limnodynastes peronii	*	*		*		*	*	
Limnodynastes tasmaniensis	*	*		*		*	*	
Uperoleia fusca	*	*		*				*
Litoria fallax	*	*		*		*	*	
Litoria gracilenta	*	*		*		*	*	
Litoria latopalmata	*	*		*		*	*	
Litoria lesueurii	*	*		*		*	*	
Litoria revelata	*	*		*		*	*	
Limnodynastes terraereginae	*	*		*	*	*	*	*
Uperoleia lithomoda	*	*		*	*	*	*	
Cyclorana novaehollandiae	*	*		*	*	*	*	*
Litoria alboguttata	*	*		*	*	*	*	
Litoria inermis	*	*		*	*	*	*	*
Litoria microbelos	*	*		*	*	*	*	
Litoria rothi	*	*		*	*	*	*	*
Notaden melanoscaphus	*	*			*		*	*
Cyclorana brevipes	*	*			*	*		*
Litoria dahlii	*	*			*			*
Litoria pallida	*	*			*	*		*
Subtotal	19	19		15	11	16	15	9
QUEENSLAND AND PNG SHARED								
Crinia remota	*		*	*	*	*	*	*
Uperoleia mimula	*		*	*	*	*	*	*
Litoria infrafrenata	*		*	*	*	*	*	*
Litoria nigrofrenata	*		*	*	*	*		*
Rana daemeli	*		*	*	*	*	*	*
Sphenophryne gracilipes	*		*		*	*		*
Litoria gracilenta2	*		*		*	*		
Subtotal	7		7	5	7	7	4	6
AUSTRALIA AND PNG SHARED								
Limnodynastes convexiusculus	*	*	*	*	*	*	*	*
Limnodynastes ornatus	*	*	*	*	*	*	*	*
Litoria bicolor	*	*	*	*	*	*	*	*
Litoria caerulea	*	*	*	*	*	*	*	*
Litoria nasuta	*	*	*	*	*	*	*	*
Litoria rubella	*	*	*	*	*	*	*	*
Subtotal	6	6	6	6	6	6	6	6
TOTAL	59	24	13	49	30	49	45	26

CODE DEFINITIONS.
Endemic to Biogeographic Region.
** In other Biogeographic Regions in QLD.

TABLE 3.

ANALYSIS OF BOTH REGIONS FROG FAUNA

1. Total Species in each Biogeographic Region

BR3	BR7	Shared
30	49	20

2. Distribution Status

	Number (both regions)
Shared Qld/New Guinea	7
Shared Aust./New Guinea	6
QLD endemic	27
Aust. endemic	19
	Total 59

3.

	BR3	BR7
Number of Biogeographic Endemics	4	20
% of Total Region's frogs	13.0	41.0
Endemics not in N.P.	4	3

4.
List of Geographically Localised Species (only found in a small area such as mountain tops) within these Biogeographic Regions.

* not known in National Park

Taudactylus rheophilus
Cyclorana manya *
Litoria longirostris *
Litoria lorica *
Cophixalus bombiens *
Cophixalus concinnus
Cophixalus crepitans *
Cophixalus exiguus
Cophixalus hosmeri *
Cophixalus infacetus
Cophixalus neglectus
Cophixalus peninsularis *
Cophixalus saxatalis

TABLE 4.

FROGS IN GROUPED NATIONAL PARKS

National Park Group	Frogs Expected	Frogs Recorded
Wet Tropics	49	
T'ville - Cardwell Range	34	24
Cardwell Ra to Walter Hill Range	36	5
Walter Hill Ra - Cairns	40	23
Cairns-Cape Tribulaton	40	7
Cape Tribulation-Black Trevathan Range	35	11
Cape York Peninsula	30	
Cooktown-Lakefield	23	13
Lakefield-Iron Range	29	1
Iron Range-Torres Strait	23	0

* See Fig 1 showing group boundaries

frog conservation; the high level of endemic and low diversity in the rainforest and the low level of endemic and high diversity in the more widespread woodlands and open forest. Another criterion is the distribution pattern of open forest/woodland species some of which are east coast and the tip of Cape York as far south as Arukun while others are centred on the southwest and southern central Cape York.

If one was to look at the plant species of Cape York a different picture from the frogs emerges. Endemicity and diversity are greatest in the rainforest areas such as the McIllwraith Range. However just because the endemicity and diversity is not high in plants in the more extensive woodlands/open forest it does not mean that they are not as equally important as rainforest and the reef. But that is another argument and I'll leave it for now.

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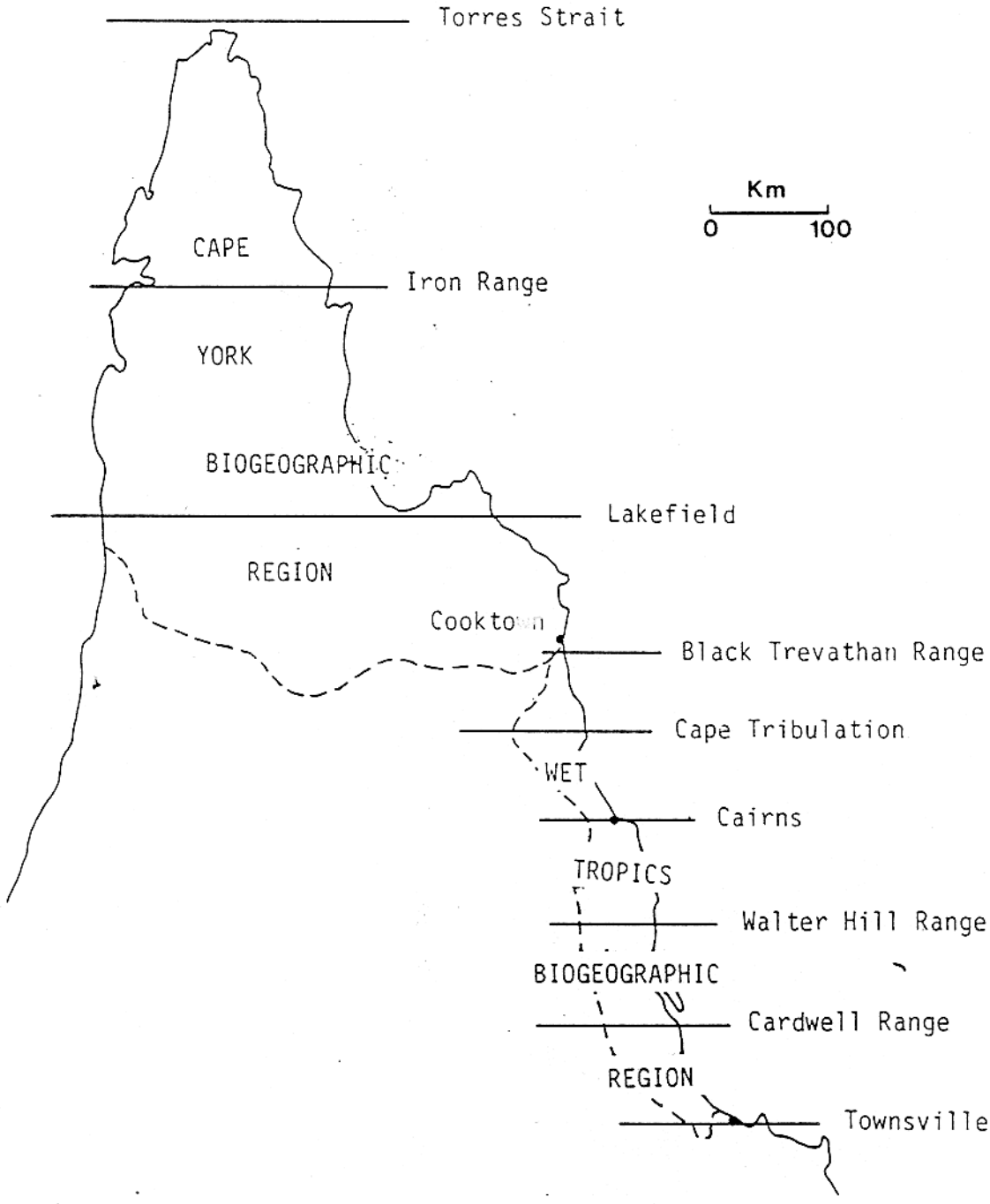


CAPE YORK AND WET TROPICS BIOGEOGRAPHIC REGIONS.

Horizontal Lines Indicate Boundaries of Park Groupings in Table 4.

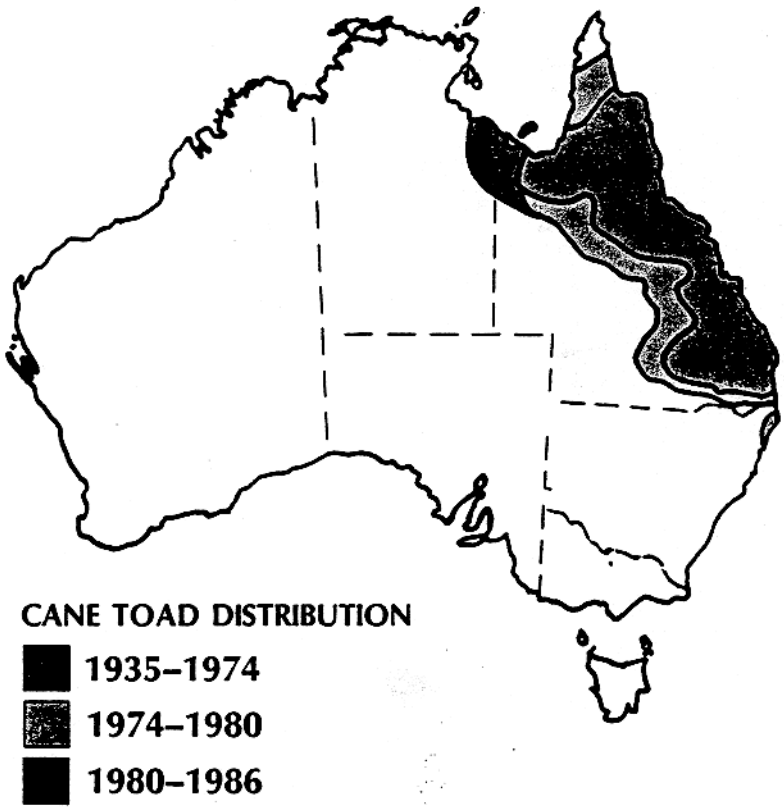
Photo: D. Maitland

Successful Conquest by the Cane Toad

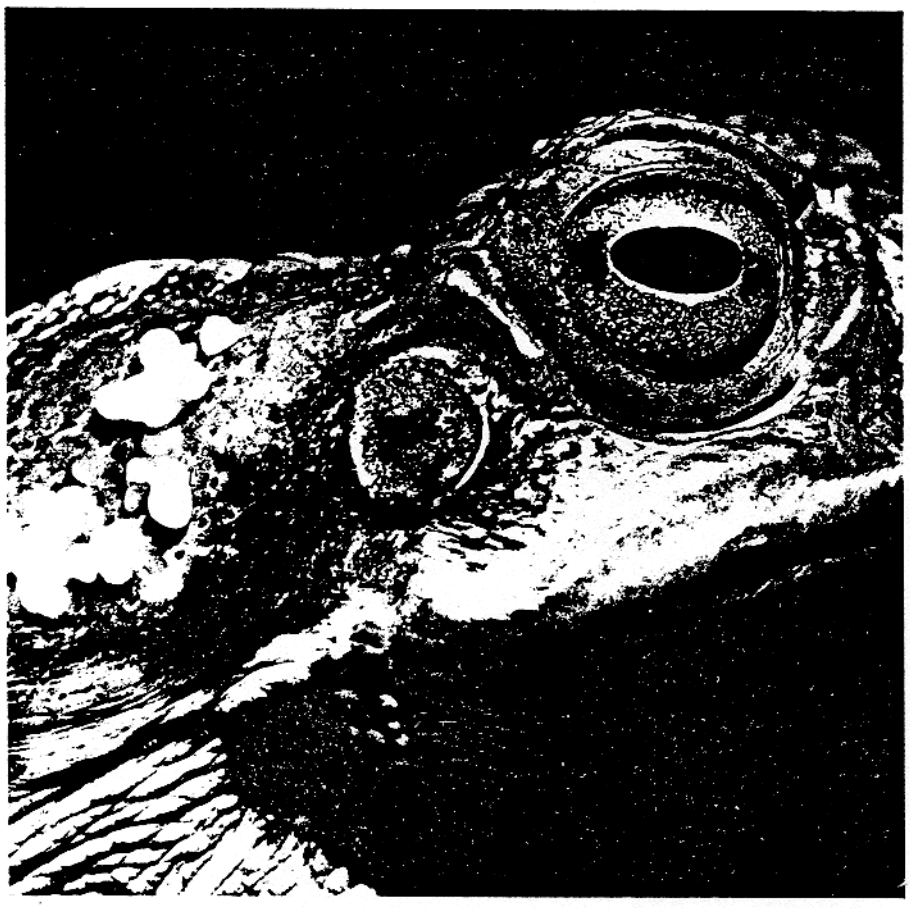
by William J. Freeland (C.C.N.T.)

The Cane Toad (*Bufo marinus*) arrived in Australia in 1935 as a consignment of 101 individuals. Initially bred in captivity, this central and South American toad was dispersed to several localities in coastal Queensland in order to control the Grey-backed Cane Beetle, a pest of sugar cane. Since then they have managed to conquer over 50 per cent of Queensland and parts of northern New South Wales, and have recently penetrated the Northern Territory. The rate of unassisted spread in northern Australia averages as much as 27 kilometres per year.

Although confined to relatively open habitats, Cane Toads live in areas with climates ranging from warm-temperate to semi-arid and the wet and seasonally dry tropics. They live on low flat plains, rocky escarpments, around tropical rain-



Distribution of the Cane Toad. Originally introduced into Queensland, it is now spreading into the Northern Territory.



Poison secreted from glands behind the tympanum. Photo: David Maitland.

forests, in wet and dry eucalypt forests, saline flats behind mangrove forests, and do extremely well in urban situations. Clearing of forests, as well as mowing, grazing and burning activities, create additional habitats well suited to Cane Toads.

Not only is their spread rapid and the area conquered huge—their population densities can also be high. Estimates from the tropical dry season indicate there are as many as 5,000 Cane Toads per hectare around waterholes. The massive area conquered and the large numbers of these animals are likely to cause great costs to humanity and the conservation of Australia's native fauna. Costs to humans must be balanced against any potential economic benefits. Costs to conservation can only be evaluated from an examination of the toad's biology and an understanding of what makes a successful invasion.

Biology of an Invader

Ecologists have developed a series of hypotheses as to why some organisms succeed as invaders and others fail. Factors thought to contribute to successful invasion include physiological tolerance of the new physical environment, availability of appropriate food in the new environment, competitive superiority of the introduced organism over native species, and resistance to native predators and parasites.

Cane Toads are indeed tolerant of a wide range of physical environments. Adult toads can withstand temperatures from 0°C to approximately 41°C, although activity occurs over a smaller temperature range. This tolerance is enhanced by their ability to control body temperature by moving to warmer or cooler parts of the environment.

Although we think of frogs and toads as organisms tied to permanent sources of water, Cane Toads are remarkably resistant to desiccation. They can withstand loss of up to 52.6 per cent of body water and can resorb water from moist soil or the atmosphere. They have been observed laying eggs in brackish water and successful development of tadpoles

can take place in up to 15 per cent sea water.

Australian habitats provide the Cane Toad with a wide array of potential food items. Unlike most frogs, Cane Toads exploit stationary food sources, which include items such as plates of dog food. However, they feed on virtually anything that moves which is small enough to be swallowed—with ants, beetles and termites making up the bulk of the diet. Moths, bugs, centipedes, millipedes, scorpions, spiders, flies, insect larvae, frogs, other Cane Toads and even small mammals may also be eaten. Depending on the particular location and abundance of prey items, toads at one site may feed predominantly on, say, beetles, while at another, ants or termites.

The Cane Toad is an extremely large (often 150 or more millimetres long) and aggressive amphibian, and would at first glance be regarded a devastating competitor for Australian frogs. Yet the sparse data available indicate that native frogs have suffered little from the Cane Toad's invasion. Dry season frog communities around waterholes in the Queensland and Northern Territory Gulf country are just as species-rich, and the individual species' populations and rates of population growth just as large, regardless of Cane Toad populations. In addition, the native frog species' patterns of habitat use, activity rhythms and foods consumed, although broadly overlapping those of Cane Toads, are little affected by the toads' presence. Why this lack of competition? Perhaps because the severity of these environments results in individual frog species' populations rarely reaching carrying capacity. Put simply, there are never as many frogs as could be accommodated by available food and shelter. However, the situation may differ in more benign environments or with other frog species.

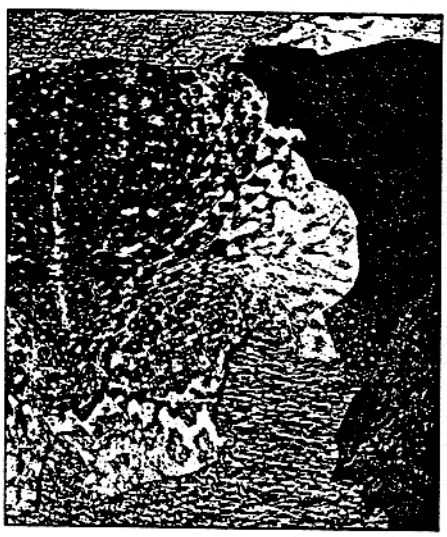
Cane Toads are resistant to many of Australia's predatory organisms. A pair of large toxin-secreting glands (just behind the head) is their most potent defence. This toxin is a lethal mixture of digitalis-like steroids, bufotenine, and epinephrine. A dog may die within 15 minutes from a single mouthing of a Cane Toad. Two cases of human fatality have been recorded. One involved the death of two South American Indians following ingestion of Cane Toad egg soup; and

Despite the Cane Toad's toxicity, this girl can't resist giving her clammy pet a hug. You never know—if she could give the toad a kiss without it poisoning her, it might just turn into a handsome prince...but then she's a little young for that. Photo: A. Mostead.

the other a Philippino Inspector of Detectives who requested that his cook provide frog legs for dinner.

Australian predators vulnerable to the toads' toxin include goannas, King Brown Snakes, Blue-tongue Lizards and native quolls among others. These animals have disappeared or exhibited major reductions in population density following Cane Toad expansion into new areas. Not all Australian predators, however, are so vulnerable. The Keel-backed Snake, frogmouths, a short-necked turtle (*Elseya latisternum*), crayfish (*Euastacus* spp.), Bustards and others feed on Cane Toads with apparent immunity. I have seen a Cane Toad between 60 and 70 millimetres long being dragged off by a large centipede, having first fallen prey to it. Other predators such as Water Rats, crows, Black Kites and Koels either open Cane Toads from the ventral side, thereby avoiding the toxin glands, or feed on already opened, road-killed individuals. The eggs and tadpoles of Cane Toads also have a toxin defence system and so are mostly avoided by Australian predators.

On arrival in Australia, the Cane Toad carried with it relatively few of its own parasites and it now lacks the blood protozoa, gall bladder sporozoans and helminths that it harboured in central and South America. Since the toad has been in Australia, it seems to have shown a degree of resistance to the parasites of Australian frogs, having acquired relatively few of their flukes and round worms, and no blood protozoans.



Raw and tanned (right) skins of Cane Toads. Photo: Margit Cianelli, A.N.T.

The Cane Toad has a relatively rapid rate of reproduction. It breeds in shallow water and can deposit as many as 50,000 eggs in one clutch, at least twice in a summer's breeding season. The tadpole can develop in only 16 days, although a month is more usual. The toads become sexually mature by the breeding season following their hatching and, in the wild, have been recorded remaining sexually active for at least five or six years. One toad was kept alive in captivity for almost 15 years.

At this stage, no single feature seems responsible for the Cane Toad's successful invasion. All that can be said is that it entered an environment in which low rates of parasitism, possibly low rates of predation and a large, underexploited food supply occur. The physical environment is well within the toad's tolerance limits and its life history enables it to become abundant and widely dispersed.

Costs and Benefits

As mentioned previously, Cane Toads were brought to Australia to control the Grey-backed Cane Beetle, a pest of sugar cane. However, at the time of introduction, there were enough data to suggest that the Cane Toad was unlikely to be effective in controlling cane beetles. In fact, there were *no* conclusive data to suggest that Cane Toads were ever effective agents for the biological control of agricultural pests. Introduction took place in the hope that control *might* be achieved, despite opposition from Australian conservationists.

Since their introduction, Cane Toads have, nevertheless, made some significant contributions to Australians. Not only have they provided many students with their first experience of amphibian dissection, but their mothers may well have had first definite evidence of the future Cane Toad-dissector's existence from a now-outdated, toad-based pregnancy test. When injected into a toad, urine from pregnant women causes maturation of the toad's gonad. This test has been replaced by faster and more specific tests.

As laboratory animals, Cane Toads have made significant contributions to scientific research and now form the basis for a small specialist leather industry. Students, researchers and the leather industry will continue to need Cane Toads but these can be bred and raised in captive situations (as was done during the introduction of Cane Toads to Australia). Large populations of wild toads are unnecessary for such purposes. The economics of captive toad breeding and raising has never been examined.

It is difficult to evaluate costs resulting from the Cane Toad invasion. Toads were once a problem for the bee industry: they would sit outside hives eating large quantities of bees. But the unexplained decline of Cane Toad populations in many areas of eastern Queensland has reduced this problem. Costs associated with toad pollution of bores, water holes, drinking troughs and swimming pools cannot be quantified. Loss of dogs is another cost. Cane Toads feed on human faeces and can act as disseminators of human worm eggs and bacterial cysts. No one has ever investigated the scale of the problem in areas with limited sanitation.

The Cane Toad has also had a significant negative impact on Aboriginal culture. Throughout the Queensland and Northern Territory Gulf country, Aborigines refer to the Cane Toad as the 'poison frog'. They are familiar with the toad's devastating impact on the goanna, which is both a food source and a major totemic animal.

While benefits to Australia from having Cane Toads are certainly measurable and of value, the economic, social and conservation costs make a 'do nothing' strategy inappropriate. What we need from Cane Toads could be provided by Cane Toad farms. At the same time, reduction of the toad's rate of spread and size of its wild population must be a target for research and, hopefully, future management action.

The need for action has been recognised. Under the auspices of the Council of Nature Conservation Ministers (C.O.N.C.O.M.), a detailed investigation is being launched into the demography and pathology of Australian Cane Toad populations by the Conservation Commission of the Northern Territory and Queensland's James Cook University. These studies will provide insight into the practicality of controlling Cane Toads and the unexplained declines of Cane Toad populations in parts of eastern Queensland. Hopefully something can be done prior to the Cane Toad's invasion of the vast wetlands at the Top End of the Northern Territory.□

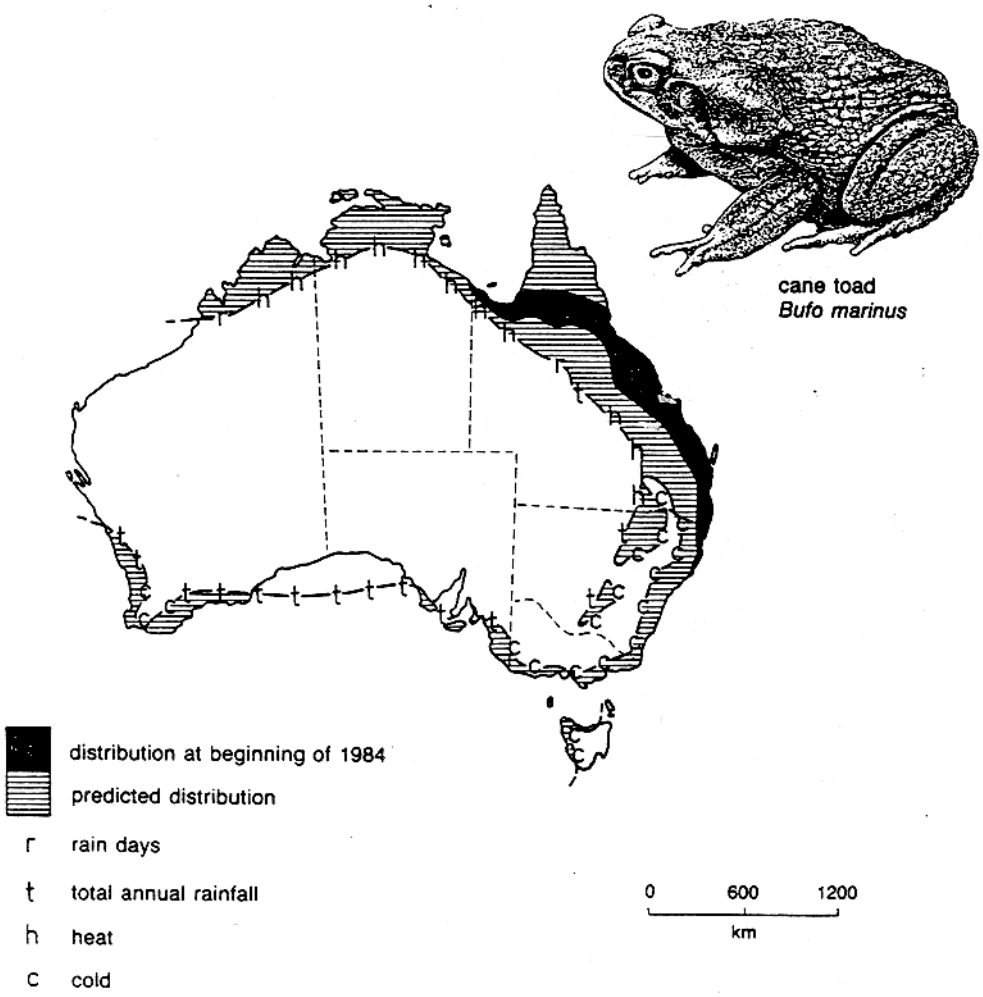


Fig. 12.2 The composite boundary for predicted limits of distribution of the cane toad Bufo marinus in Australia. This line suggests that each of the four climatological variables (R = rain days, T = total annual rainfall, H = heat, C = cold) may present a boundary to the spread of toads on at least one front. Areas predicted to be suitable for occupancy by toads are indicated by horizontal hatching. The distribution of the toad at the beginning of 1984 is shown as solid black (R. Floyd personal communication and van Beurden, 1981).

"Once upon a time, there was a beautiful frog who was changed into a princess by an evil witch . . ."

CANE TOADS

PG

In a unique blend of personal anecdote and absurd fact, CANE TOADS, An Unnatural History exposes one of the most bizarre biological blunder of all time. It is a quirky, offbeat film, made by an exciting new filmmaking talent.

In 1935, in a strategic operation designed to save the nation's sugar cane crop from destruction by the Greyback beetle, the Queensland Government imported a sackload of Bufo Marinus, the Cane Toad from Hawaii.

What a team of reputable scientists failed to realise was that the beetle could fly and the cane toad couldn't. The mission was a failure.

Oblivious to all this, the cane toad adapted beautifully to its new surroundings and proceeded to breed so rapidly that it fast became a pest of plague proportions.

They spread everywhere and ate everything. Everything that is, except the Greyback beetle.

"The toad will eat virtually any living thing that's small enough to fit into its mouth. In fact, one researcher showed that it will try and eat ping pong balls as they're bounced past in front of them."

Dr Robert Floyd
Animal Ecologist

Local farmers were not amused.

"They pose a bigger menace that the German Army in World War II."

Mr Tip Byrne
Cane grower, Tully, Qld

But nothing could stop the marauding menace. Today, BUFO MARINUS is a common suburban sight. Indeed, many a pragmatic Queenslander has adopted the "if you can't beat 'em, join 'em" approach to living down amongst the toads.

"When we first came north, I had friends with little girls who actually kept cane toads as pets ... they used to put little frocks on them and put them in little beds ... the toads didn't seem to mind at all."

Marie Roth
Gordonvale, Qld

Pest or pet, Queensland, if not Australia, is being overrun by these fat, slimy, ugly beasts.

CANE TOADS, An Unnatural History, tells the story of this amphibious assault — the whole story, warts and all.

COMMENCES 11 NOVEMBER

AT THE **CINEMA CAPRI**
Cairns. Phone 51 3817

"KINKY, IRREPRESSIBLE, BLACK COMEDY ..."
— Anna Maria Dell'Oso, ***Times on Sunday***

"JUST WHEN YOU THOUGHT IT WAS SAFE TO GO BACK TO QUEENSLAND ... CANE TOADS, a must see movie." *— John Hanrahan,* ***The Sun***

"ONE OF THE FUNNIEST FILMS YOU'LL SEE ALL YEAR."
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— David Stratton, ***Sydney Morning Herald***

"A SIMPLY WONDERFUL FILM, DON'T YOU WORRY ABOUT THAT."
— Joh Bjelke Petersen

CANE TOADS

PG

An Unnatural History

A Film by Mark Lewis

COMMENCES 11 NOVEMBER

AT THE **CINEMA CAPRI**
Cairns. Phone 51 3817

The Eungella Gastric-brooding Frog, *Rheobatrachus vitellinus*, lives in streams above 400 metres in altitude, at the northern end of the National Park.

The frogs of Eungella have the highest proportion of species restricted to the area of any vertebrate group, with three of the seven rainforest species found there being unique to the region. Both day frogs, Liem's *(Taudactylus liemi)* and the Eungella *(T. eungellensis)*, are unique to the area, the former calling during the day and night, while the latter is more active during the day. However, the best known of the three unique species is the Eungella Gastric-brooding Frog *(Rheobatrachus vitellinus)*, which was discovered in January 1984 and is one of only two species in the world (both in Queensland) known to brood its young in its stomach.

The Eungella Gastric-brooding Frog has a very limited geographical range. It is found only in fast-flowing, perennial streams in rainforests above 400 metres in altitude, in the wetter northern half of the Park. Generally, it is a dull brown frog but golden on the underside of the legs, arms and lower abdomen, hence its specific name *vitellinus* meaning egg yolk. The female, up to 83 millimetres in length, broods the young in her stomach. In the Southern Gastric-brooding Frog (the only other known gastric brooder) the mother swallows the eggs or early larval stage. Her stomach undergoes structural changes and her digestive juices are inhibited, probably by the secretion of a prostaglandin. The Eungella Gastric-brooding Frog differs in that there is no major structural change to the stomach wall and, as yet, it is not known what chemical changes take place. The female becomes very distended and finally gives birth through the mouth and, in the only record of this being seen, a female gave birth to 22 developed young frogs, each approximately 15 millimetres in length.

The smaller adult male Eungella Gastric-brooding Frogs, up to 58 millimetres in length, have been heard calling at night from September to early December, which is presumably the mating season. The females are ready to give birth in January and possibly in February. The diet of the frog includes small crayfish, caddisfly larvae, terrestrial and aquatic beetles, and even Eungella Day Frogs. It is both an aquatic and stream edge feeder.

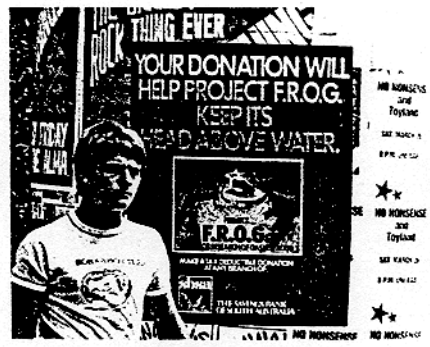
The two day frogs are found in the same streams as the Eungella Gastric-brooding Frog, but have a slightly wider geographical range. Liem's Day Frog prefers seepage areas adjacent to the creeks, while the Eungella Day Frog is found on rocks in streams or in the splash zone of cascades and water-falls. The former has a very fast tapping call, but the call of the Eungella Day Frog can barely be heard above the rushing water with which it associates. It also communicates by visual cues, which include flicking and waving of the legs, head bobbing, and 'Charlie Chaplin'-type hops. This additional mode of communication is perhaps not surprising for a frog that is active during the day in very noisy surroundings.

Much attention is being directed by scientists at the gastric-brooding frogs because of their extraordinary method of breeding. The Southern Gastric-brooding Frog, found only in south-eastern Queensland, has caused some consternation because it has inexplicably disappeared. The last one found in the field was in 1979. The Southern Day Frog, in the same genus as the day frogs at Eungella, lives alongside the Southern Gastric-brooder in a similar fashion to the day frogs and gastric-brooder at Eungella. It too seems to have disappeared over its entire range. The disappearance of these two frogs is presently considered to be a natural fluctuation in their populations, albeit of unusual amplitude and duration,

Above: Plate 17 Oral birth.
(D. Caville)

Right: Plate 18 Oral birth.
(D. Caville)

Below: Plate 21 Advertisement for the Project Frog Appeal. (P. Kempster)



Frogs: Masters in the Art of Survival

Frogs and toads have an unfortunate public image.

Toad and toady are nasty words in a number of languages. Fairy stories tell of princes being turned into frogs by wicked witches, of frogs being gobbled up by "a lilywhite duck"; Toad of Toad Hall added a touch of class, rather cancelled out by our cartoon characters like Freddo and Kermit.

Aboriginal legends tell of the giant frog who swallowed up all the water in the world. The desperate animals tried in vain to make him laugh. At last, when the eel began dancing on its tail, the great frog opened his mouth to laugh, letting the water rush out in a great flood.

As frogs are usually heard but not seen, most of us know very little about them — a pity! These extraordinarily interesting animals are members of a major group of vertebrate animals called the Amphibia, which are variously at home in or out of water.

Some 270 million years ago at the end of the Devonian Period, the ancestral amphibians developed, it is thought, from lung fishes which crawled out of the waters to become the first vertebrate colonists of the land. Fossil records 200 million years old from Madagascar of a *Triadobatrachus* could well represent an ancestor of the present day frog.

Frogs are members of the only amphibian order found in Australia, and New Guinea, the Anura. Like other amphibians such as newts and salamanders, tadpoles have tails, but adult frogs, as they adapted to life on land, found a tail was more bother than it was worth and just absorbed it.

They may have very little brain, but instinct and an amazing adaptability enable them to fill niches in habitats as diverse as snowy mountains, hot deserts, cold deserts, waterfalls, rainforests and every possible type of lowland and wetland. They have kept their biological and evolutionary options open to an amazing degree.

In different countries different species may have a superficial similarity because the basic good design requisite for occupation of a particular niche seems to have evolved independently in unrelated species.

New Discoveries are Frequent

Some 2,550 species have already been described while many more await discovery, with tropical and sub-tropical areas the most likely hunting grounds. Some species new to science have been discovered in the stomachs of predators. Some species, captured with great difficulty, have been stolen from under the noses of the herpetologists by cheeky thieves such as Sacred Kingfishers.

Most frogs from Australia and New Guinea are unique to the area. They include some of the smallest, some of the largest, some of the strangest and most interesting, some of the most colourful and most beautiful frogs in the world.

In New Guinea the natives tell of a huge frog, with a body 300mm long, as big as a baby and providing enough meat for several men. They hunt it with dogs, and shoot it with arrows — but haven't yet caught a specimen for the scientists.

Four families of frogs are represented in Australia and New Guinea:

Hylidae — mostly tree frogs, with slender bodies, long limbs and disc pads on finger tips and toes.

Leptodactylidae — chiefly ground dwellers and burrowers.

Microhylidae — six species of tiny frogs, some less than one centimetre in length, most of which live in the rainforests between Townsville and Cooktown. There are about 85 species in New Guinea. These do not have free-swimming tadpoles.

Ranidae — these fill niches in a wide variety of damp habitats, chiefly in New Guinea and the islands.

Tyler gives a fairly recent check list of the species recorded from the Australian States as: Western Australia, 68; South Australia, 23; Victoria, 32; New South Wales, 63; Tasmania, 10; Queensland, 94; Northern Territory, 36.

Some species have a wide distribution. The Brown Tree Frog, *Litoria ewingi*, is found in South Australia, Victoria, New South Wales, Tasmania and Queensland. The Desert Frog, *Cyclorana platycephalus*, occurs in Western Australia, South Australia, New South Wales, Queensland and the Northern Territory. Others such as the Corroboree Frog and the unusal aquatic frog *Rheobatrachus silus*, which swallows its eggs, have a very restricted habitat.

The Corroboree Frog and the Blue Mountains Tree Frog recently featured on our postage stamps.

Frogs or Toads

Before reading Michael Tyler's book, I had a mental image of a frog as a smooth, streamlined jumper — of a toad as fat, warty and waddling. The scientists separate them by a fine anatomical distinction — subject to much disagreement today — which would class most of our native species as toads. Tyler chooses to call them all frogs, except for the Cane Toad, *Bufo marinus*, and the Holy Cross Toad, *Notaden bennettii*.

From the Beginning...

Most of us have seen the sago souffle of frog spawn floating on still waters — a fluff full of little eggs without shells — and later the multitudes of small, fat black tadpoles, breathing through gills, their skins full of tightly coiled intestines, which emerge from the eggs to develop by one of nature's special miracles into the four-legged, vertebrate, mainly land-dwelling animals we know as frogs.

While some species lay their eggs on land or in trees, with fully developed froglets growing inside the eggs, most species return to water to breed. When the season (different seasons for different species) and the water supply are propitious, the male frogs flock to the ponds and begin calling for the females to come to them. They call loudly, insistently, deafeningly, day and night.

When a female appears, there may be a frantic scuffle until one of the males manages to seize her from behind and ride pick-a-back as she swims around and deposits her eggs — up to 4000 of them — with his sperm released above them. Mucous around the eggs swells up on contact with water to make the floating meringue.

The course of true love is far from smooth for some of the big tree frogs such as *Litoria infrafrenata* as they make their way to water. Agile and at home in the trees, they are poor jumpers on land, while dust, gravel twigs and leaves stick to their skins until the poor animals are scarcely able to move, despite stopping occasionally to scrape off some of the rubbish with their hands.

Though most species leave their egg

ralls and young to look after themselves, the Australian Hip-pocket Frog and the Platypus Frog go to extraordinary lengths in parent care.

Single Parents — with a Difference

The Marsupial or Hip-pocket Frog, *Assa darlingtoni*, which lives in the rainforests of the Macpherson Ranges between NSW and Queensland, has small pouches in the skin over his hips. When the 10 or so large eggs laid by the female hatch, the male swims around in the spawn until the little tadpoles find these pockets, butt their way in with their heads, and stay with the father until they are fully developed. As they can reach a length of 11mm and as father is only 20mm from snout to vent, they eventually take up so much space that his stomach and internal organs are compressed to the extent that he is quite unable to eat.

In the Conondale Ranges just north of Brisbane, a nondescript looking female aquatic frog, the Platypus Frog, *Rheobatrachus silus*, cares for her developing young by swallowing the eggs and carrying them around in her stomach until, as tadpoles or froglets, they are capable of leaving home. For this to be possible, the mother must have some way of ceasing to pump gastric juices and enzymes into her stomach, which means that she, also, is quite unable to eat while carrying her young. If scientists could discover just how it is she turns off her gastric juices, they might well be on the way to a major medical breakthrough in the treatment of stomach ulcers.

Rheobatrachus silus, of such enormous interest to scientists, is thought to occur in only limited numbers in a small area of Queensland. Its survival may well depend on conservation of this habitat in a national park under legislative protection, backed by stiff penalties.

Where There's a Creek There's a Croak

Frog calls are so distinctive that herpetologists, by listening to night noises or even to a tape, can immediately recognise species whose calls they know and identify the presence of "foreigners". Then comes the really hard work as, moving slowly by torchlight through swamp or dark forest, the gumbooted hunters try to capture the swift, elusive animals. Three people in a team effort, with one keeping a torch trained on *both* eyes of the frog, sometimes succeed; more often they don't. It is cold, messy and often very frustrating.

Females respond only to the call of the male of their species. In a laboratory experiment, with different taped calls, the various females moved without hesitation towards the familiar sound and even sat on top of the appropriate microphone.

Calls can be extraordinarily varied — moaning, bleating, creaking, tapping, barking, growling. The Pobblebonk, or Banjo Frog, *Limnodynastes* sp. goes Bonk Bonk. The big tree frog, *Litoria infrafrenata*, gives a mating growl like an angry dog, a distress call like a cat — most perplexing for the real cats. *Notaden bennettii* says Whoo-oo-oo like an owl; the Spotted Grass Frog, *Limnodynastes tasmaniensis*, goes Uk-uk-uki; the Green and Gold Bell Frog, *Litoria aurea*, croaks Craw-awk crawk crok crok.

In addition to mating calls, there are territorial calls, calls after rain, "release" calls, when a male seizes another male or a female who has already spawned, and screams of fear and distress. (It takes a long time for a snake to swallow a big frog.)

The sheer volume of sound produced by some of these relatively small animals is often surprising. In addition to larynx and vocal chords, pharynx and mouth cavity, they can use the air held and, as resonance chamber, a great vocal sac ballooning out from the throat like bubble gum bagpipes.

Instead of external ear openings, frogs have small discs on the head (behind the eyes) which act like the membrane of a drum and "function as frequency filters, rather like radio receivers tuned to one station".

Three Ways to Take a Breath

Depending on just one means of obtaining oxygen would have severely limited the ability of frogs to adapt to such a wide range of environments. Frogs that live chiefly under water absorb oxygen from solution through the capillaries in the skin. Those that live in the desert, underground, motionless, needing practically no air, take what they need and release carbon dioxide through the skin without even the effort of breathing. Under normal conditions, they can breathe through the roof of the mouth or use their simple lungs.

Frogs are Non-drinkers

Frogs don't drink. They absorb water through the skin — from ponds, rain, dew, condensation or by flattening their bodies against a moist surface. Frogs can also lose moisture just as readily through their skins — a compelling reason for them to move about and hunt at night.

In arid areas, when creeks and lagoons are drying, the desert frog, *Cyclorana platycephalus*, soaks up water until it becomes virtually a bloated waterbag. With sharp little "spades" on the soles of its feet, *Cyclorana* shuffles into the ground, excavating a vertical pit which can be up to a metre in depth.

When the top of the sandy shaft caves in, the frog is thought to move around and around, compressing the soft earth to form a little smooth-walled cell in which it can live out the drought for up to two years. Some species exude mucous which, drying to a sort of cocoon over the whole body, protects them against loss of moisture and oxygen.

Aborigines are adept at finding the tops of these collapsed shafts. Sometimes, by stamping about on the dry surface, they can arouse give-away croaks of protest from the underground frogs. The water they hold, said to be quite palatable, has saved many a life.

Under very cold or very hot, dry conditions, other types of frogs huddle together in shelter, leaving as little individual skin surface exposed as possible.

Frogs Gobble Their Food and Eat Their Own Skins

Frogs eat their own skins and the process has been described as rather like a SCUBA diver eating his own wet suit. It is frequently necessary because the frog, like snakes, many insects and other animals, can grow in size only by completely discarding its skin. When a new skin has grown, the frog rips and tears away at his old skin until he can pull it off and stuff it into his mouth. A frog also makes very good use of his little four-fingered hands to pull unpleasant-tasting objects such as stink bugs out of his mouth.

Although the Cane Toad will eat vegetables, garbage and "dead" food, most frogs eat only live prey which will fit into their mouths . . . the larger the animal, the larger the victims, which can include snails, worms, scorpions, centipedes, fish, small birds, lizards and snakes as well as many insects. The W.A. Turtle Frog *Myobatrachus gouldii*, lives in termite nests and eats enormous numbers of them, as does *Notaden nichollsi*.

Many species of frogs have a long tongue which can be flicked out to capture prey and draw it back into the mouth. These useful "fishing rod" toungues, which have a sticky upper surface, are attached to the front of the mouth. Other species, many Leptodactylids and some of the Hylids, cannot flick out their tongues, which are almost completely fused to the floor of the mouth. These animals must catch their dinners by jumping and grabbing and swallowing the struggling prey whole.

Eyes That Do More Than See

Having large eyes and small nostrils virtually on top of the head, frogs can see and breathe even when almost completely submerged in water. Their pupils, so well adapted for night vision, contract under bright light to slits so distinctive that they immediately identify two Australian genera: *Litoria* have a horizontal slit, *Nyctimystes* a vertical slit, while others have diamond or rhomboid shaped slits.

While the eyes of snakes are fully protected in strong bony sockets, a frog has only tough membranes between the eyes and the roof of the mouth. At will it can depress the eyes to bulge into the mouth, even possibly to touch the tongue. A multiple benefit, this can be a protection against external injury, a contribution to camouflage and a help

in eating. When fully depressed into the mouth, the eyeballs are thought to become extremely useful as an extra pair of stubby hands to hold a struggling animal while it is being swallowed.

As the eyes are such prominent features obvious to predators even in a motionless and otherwise well-camouflaged frog, all sorts of cunning skin markings are used to disguise them.

Hunters and Hunted

Frogs occupy a most important place in the food chain of swamp, river, forest and even desert communities. They eat enormous numbers of invertebrates and small animals. In turn, at all stages — spawn, tadpoles, adults — they are the food of a wide variety of animals such as fish, turtles, insects, spiders, snakes, lizards, rats, cats, dogs, pigs, and bigger frogs. Predator birds include Kookaburras and other kingfishers, currawongs, whip birds, cormorants, egrets, herons, snipe and water rails.

In France, the large muscles on the hind legs are regarded as a gastronomic delight, the white meat like delicate breast of chicken. In the protein hungry highlands of New Guinea, tadpole collecting and frog hunting are on all the time as a means of providing essential food. In New Britain and New Guinea, dogs are used to hunt some of the big frogs such as *Rana arfaki*, with bodies up to 200 mm in length.

Survival in a Dangerous World

Using all types of biological means, frogs are adept survivors in a world full of danger.

Most species lay enormous numbers of eggs. Despite huge wastage, some usually survive to adulthood. Even if a whole year's production is lost — by drought or flood, for instance — some adult frogs survive to breed for a number of years. In captivity, *Litoria caerulea* has lived for 16 years, *Bufo marinus*, the Cane Toad, for 40 years.

Frogs move about and hunt at night. They are masters of the art of camouflage. Some, as they jump for safety, surprise predators by a display of vivid "flash" colours normally hidden on inner thighs and under-bodies.

Fast, erratic jumping — little ones like grasshoppers, larger frogs like rockets — is good escape strategy for many. Tree frogs have, beneath their finger discs, glands secreting a sticky substance which helps them to hold on to a perch and grasp leaf or branch as they jump. Some have partial webbing on hands and feet which enables a leap to be extended by a glide.

Some South African frogs have been known to cover 10 metres in a single jump, but three metres seems to be a maximum for Australian and New Guinea frogs — this can still be 30 times the length of their bodies.

Some of the tree frogs live up to 50 metres above the ground. Other frogs, as previously mentioned, have adapted to life underground in coping with both aridity and/or cold.

Some of the little Pseudophryne toadlets feign death; the bullfrogs swell up like balloons, the Cane Toad tilts its body side-ways to present as large an image as possible to a predator who may decide that such an animal is beyond its capacity to handle. Some wear warning colours (yellow and black, for instance) associated with unpleasant creatures like wasps. The Corroboree Frog, which carries these striking colours, is also a tough customer which will butt intruders out of its burrow.

Skins, and glands on the skin are important. The drug Caerulein, now produced synthetically, after being discovered in the frog *Litoria caerulea* in Queensland, is extremely useful in the treatment of high blood preassure. The Cane Toad and some of the thick-skinned, dumpy, short-legged Microhylids have glands secreting dangerous poisons. Others exude a slimy mucous which makes the frog too slippery to hold, sometimes in association with a strong odour (*Litoria aurea* does both) to the extent that Tyler comments: "with a little experience, a sniff is almost as good as a glimpse as an aid to identification".

Conservation

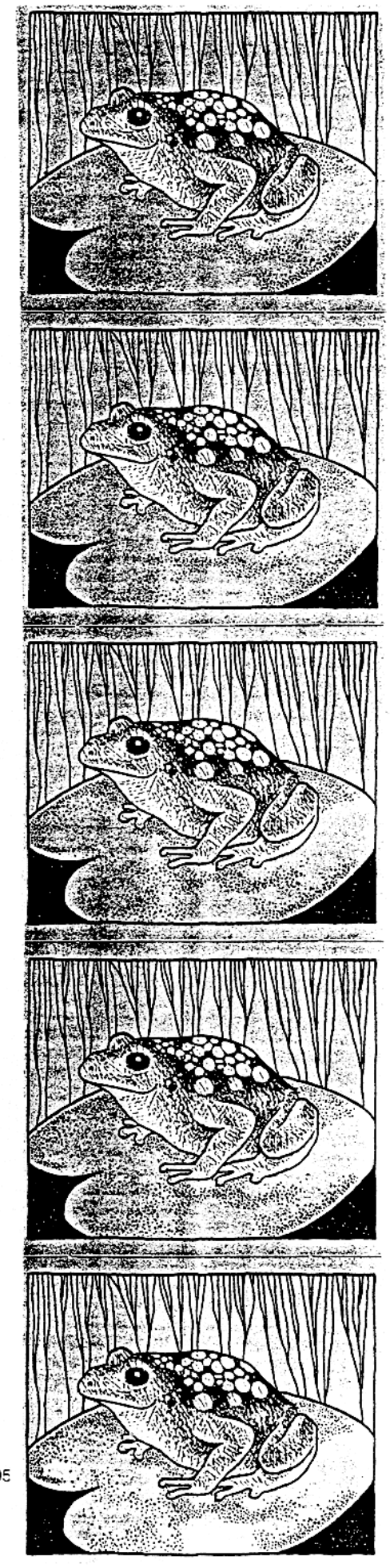
This is a difficult problem because so little is known about most species. Some are widespread and abundant, others are represented by limited populations restricted to relatively small areas and these definitely need protection. The Brooding Frog, *Rheobatrachus silus*, may be so rare and certainly such a prize for any herpetologist that conceivably the whole population could end up in museums and vivariums.

Protection of some species and not others presents problems of identification and of administration. Conservation of viable areas of the habitat of rare species would seem to offer a partial solution.

Export of frogs is controlled by the Australian Government, through a licence system which prohibits export for the pet ~~trade~~ while allowing export of animals for research or to zoos and similar institutions. (I once met a Bromeliad collector who used to post little frogs to a similar enthusiast in Germany — keen to have froglets living in the pools of water held by the leafy cups of his exotic plants.)

On the whole, frogs receive virtually no recognition from Australian law makers. It would be good to think that, through reading Michael Tyler's book, many more people will take an interest in these amazingly varied little animals which form so large a part of our heritage of unique wildlife.

For futher reading: *Frogs* — (How they Strive and Thrive and Stay Alive) by Michael J. Tyler, Second Edition 1982, William Collins Pty. Ltd., Sydney. RRP $9.95
Reptiles and Amphibians of Australia, Harold G. Cogger, 1979. A. H. and A. W. Reed, Sydney. Check lists, locality maps etc.

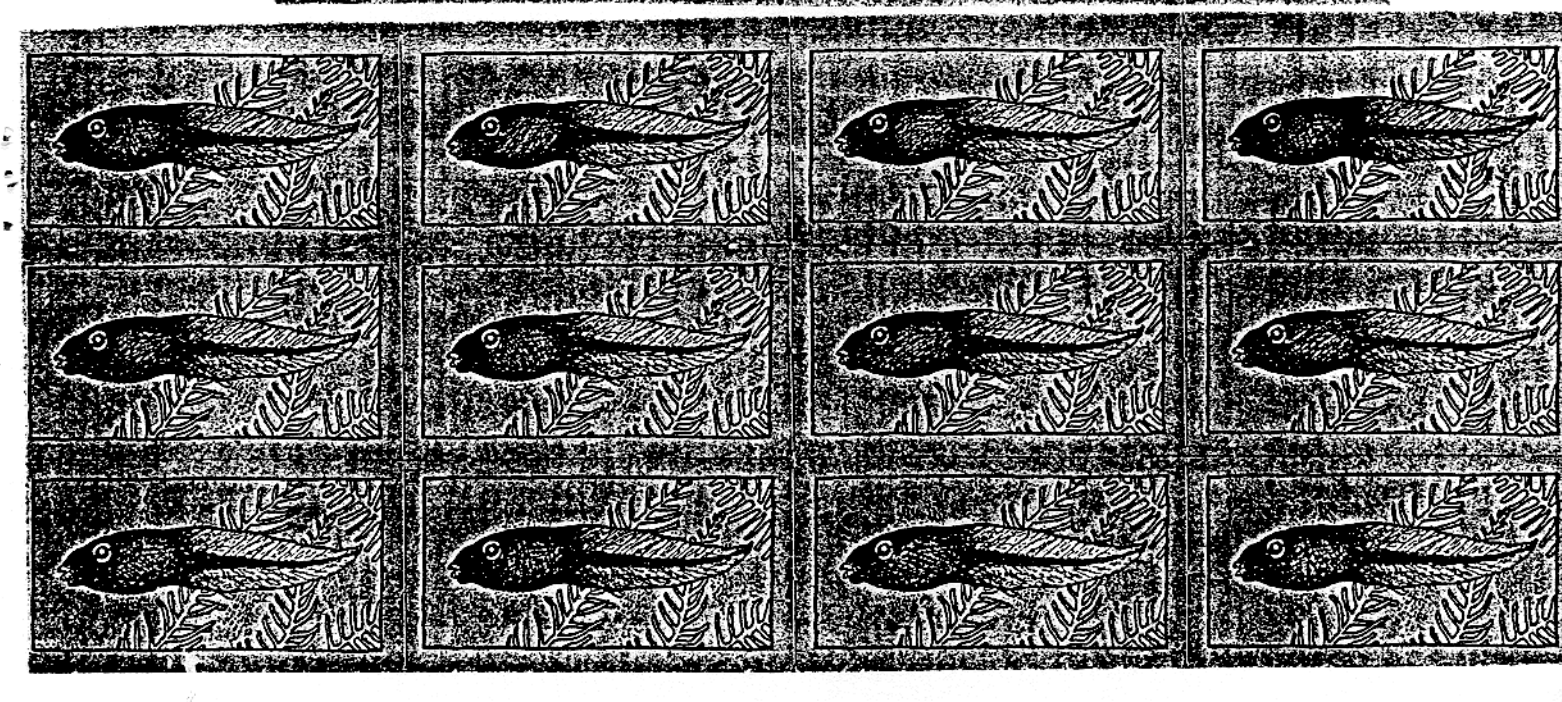


Frogabout BOARDGAME

A fascinating educational game that tells you all about the ecology and life history of our extraordinary Australian frogs.

INSTRUCTIONS –

* This game is for two or more players aged nine or over.
* The cards, tokens and spinning wheel have to be pressed out first. You can use your own die or make up the spinning wheel from the card provided.
* The object of the game is to get to the end first (you must throw the correct number and land exactly on the finish) where you become a mature, adult frog.
* The small chance cards (tadpole cards) and the large chance cards (frog cards) are placed on their respective positions on the Frogabout board.
* When you pick up a frog card, you must read it aloud before doing as it says.
* To start the game, each player has one turn at spinning the wheel or throwing the dice. The player with the highest number starts, and the rest follow in a clockwise direction.
* If you land on both pollution spots, and have to return to the start, you begin again without any pollution contamination.

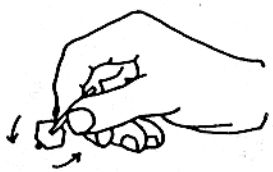


START
You can choose which direction you wish to go.
A fish chases you. Go forward 2 spaces.
You find some dragonfly nymphs to eat. Pick up a tadpole card.
Pick up a tadpole card.
Pick up a tadpole card.
Your back legs grow. Pick up a tadpole card.
DANGER
A hungry tortoise threatens you. Stay there until you throw an odd number to swim underneath to next lily pad.
DANGER
You are frightened by a hungry water rat. Swap places with the nearest player behind you.
Pick up a frog card.
Egg-laying lilypad.
Whirligiggles – frog food. Pick up a frog card.
Jump for joy. You have found a mate already. Advance to 'Egg-laying lilypad'.
Pick up a tadpole card.
Have an extra throw to miss a darting Kingfisher.
Pick up a tadpole card.
Pick up a frog card.
DANGER
You are eaten by a rabbit. Return to start.

Pick up a tadpole card.
You are tired. Go directly to the Resting Rock and miss one turn.
Resting Rock
Pick up a frog card.
You see a succulent dragonfly. Return to the Resting Rock to eat it and eat a frog card when you get there.
You can choose which direction to go.
You lose your tail and become a frog. Pick up a frog card.
DANGER. You are mesmerised by a snake. Stop here until you throw 2 or 3 to break the trance.
Pick up a frog card.
Pick up a frog card.
Pick up a frog card.
Pick up a frog card.
Hot weather. Have a rest. Miss 1 turn.
You have reached Paradise Pond and are entitled to one years free supply of fresh blowflies.
FINISH
You are hungry. Return to Whirligig Beetles for food and pick up a frog card.
DANGER. You are hungry wa by a hungry wa Swap places with the nearest tadpole behind you.

INSTRUCTIONS
Press out your frog tokens, frog cards and tadpole cards and place on the board. Make up a spinning wheel or use your own die and you are ready to leap into Frogabout.

MAKING YOUR OWN SPINNING WHEEL
1. cut out the hexagon below
2. push a match through the centre. See diagram.
3. Hold match between thumb and index finger and spin.



Free Throw Card

Keep this card to use when you are instructed to miss a turn.
Return to the bottom of the pack after use.

Free Throw Card

Keep this card to use when you are instructed to miss a turn.
Return to the bottom of the pack after use.

DANGER
You are chased by a hungry heron. Throw again and go BACK by this number.

DANGER
Hail storm approaching. Everyone go back 2 spaces.

DANGER
A hungry Black Snake is ahead. Go back 3 spaces.

You are trapped by a Nursery-web Spider. Throw an even number to escape.

A big frog threatens you. Change colour and escape by going back 3 spaces.

Time to shed your skin. Miss one turn.

Swap places with the nearest player behind you.

You catch a delicious dragonfly nymph to eat. Have an extra turn.

You catch a yummy blowfly. Have another turn.

Your back legs grow and you can move faster. Join the leader.

Swap places with the nearest player behind you.

Every player advance 2 spaces except the leader.

You are picked up and inspected by a curious human. Miss one turn.

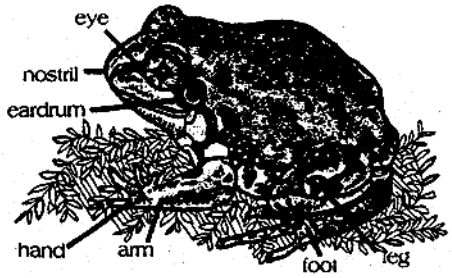
There is a long dry spell and your pond dries out. You are stuck in the mud. Miss one turn while you wait for rain.

WHISTLING TREE FROG

Tree frogs usually have pads on their toes and fingers, making it possible for them to climb.

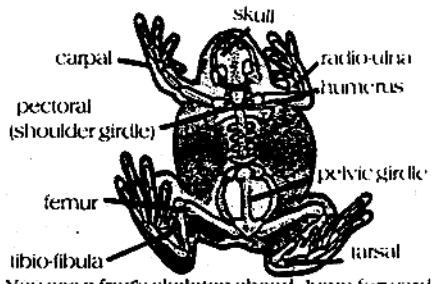
You are a Tree Frog resting on a branch. You see a delicious-looking spider and leap forward 2 spaces.

PARTS OF A FROG



You have stopped to admire yourself and you fall off your lily-pad. Go back 3 spaces.

SKELETON OF A GRASS FROG



You see a frog's skeleton ahead. Jump forward 2 spaces to investigate.

GASTRIC BROODING FROG

An unusual aquatic frog was discovered in 1972. The Stomach-brooder swallows its eggs and broods its young in its stomach without digesting them. Perfectly formed little frogs hatch from the adult's mouth.

Miss 1 turn while your froglets hatch.

WIDE-MOUTHED FROG

Discovered by comedian Dave Allen, this gregarious, talkative frog which frequents Irish hotels, has an amazing shrinking mouth when confronted by predators.

Imitate a Wide-mouth Frog while waiting for your next turn.

EATING HABITS

When a frog sights its prey, it flicks out its sticky tongue which is attached to the front of its mouth. The prey is crushed and everything which protrudes is shoved in with the frog's hands. Watch a frog swallow – its eyeballs sink down.

Leap backwards 3 spaces to catch a fly.

WATER-HOLDING FROG

The Water-holding Frog stores water in its bladder and body cavity so that it can stay dormant in its burrow all through the hot summer. This is called aestivation.

A frog ahead of you is digging a burrow, leap forward 1 space.

BLUE MOUNTAINS TREE FROG

This frog has a broad triangular head and prominent eye bulges. The dorsal surface varies in color: green to yellow to brown and plain to patterned. The fingers aren't webbed, but the toes are. It eats mainly insects and spiders.

You've seen an insect ahead, jump forward 4 spaces.

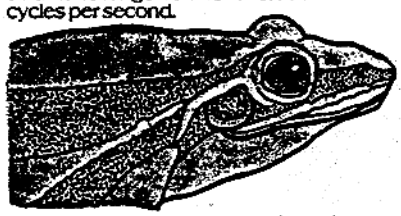
CORROBOREE FROG

This plump, glossy frog with bright yellow and black stripes crawls through the alpine sphagnum bogs in southern New South Wales.

You have spotted an enemy. Go back 4 spaces.

FROGS' EARS

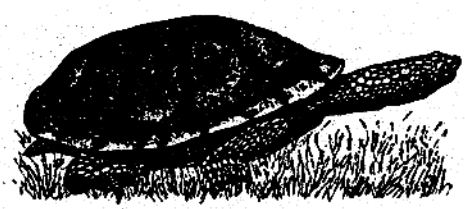
Frogs have eardrums covered by skin, and can only hear in the sound range from 50 to 10,000 cycles per second, compared to a human's range from 15 to 15,000 cycles per second.



You have just heard a mate call you, leap forward 5 spaces.

PREDATORS

Fish, tortoises and larger frogs all prey on small frogs, but the greatest predators are wading birds and snakes. Tortoises attack from under the water.



You have spotted a hungry tortoise, leap back 3 spaces.

SPOTTED GRASS FROG

The Spotted Grass Frog is found in Eastern Australia along the borders of marshes, ponds and streams. Its machine-gun call sounds like – "uk-uk-uk-uk"

Say this call aloud twice and then move forward 5 spaces.

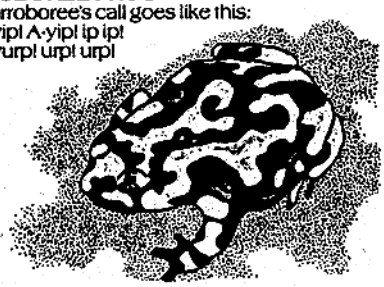
AUSTRALIAN MARSUPIAL FROG

This frog lives under rocks and masses of rotting vegetation in the Macpherson Ranges of S.E. Queensland. The tadpoles climb into special pouches along the father's side. The number of young averages ten.

You are weighted down with tadpoles, subtract 2 from your next go.

CORROBOREE FROG

The Corroboree's call goes like this:
A-yip! A-yip! ip ip!
A-yurp! urp! urp!

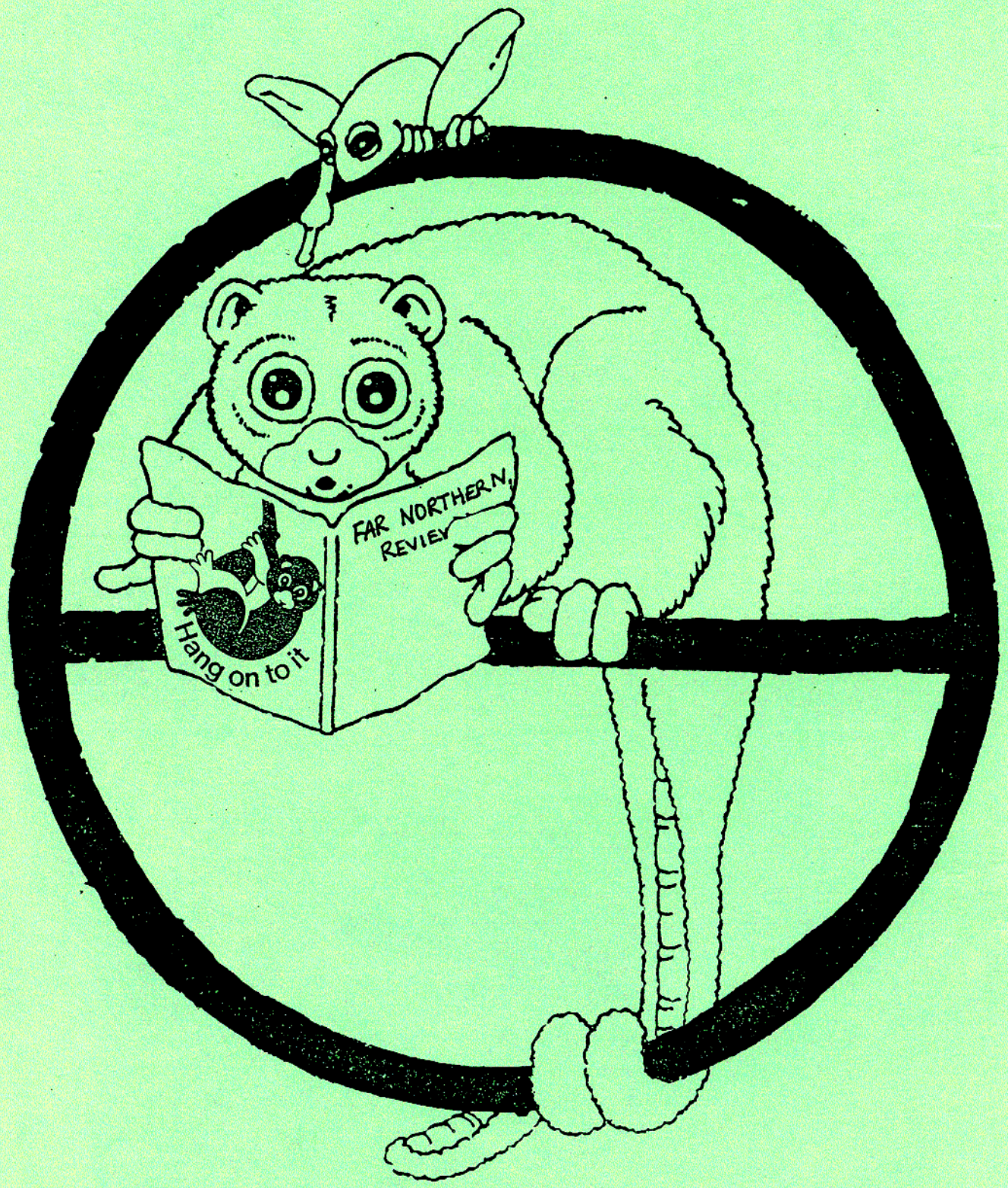


Say this aloud 3 times, then go forward 4 spaces.

GOLDEN BELL FROG

This cannibal frog is our only really aquatic frog. Its back feet are webbed and its back is a smooth green with coppery brown stripes. It has a pointed snout.

You are interested in other frogs for food. Go directly to the lily-pad of the nearest player.



DEADLINE FOR CONTRIBUTIONS IS THE FIRST DAY OF EACH ISSUE MONTH